SCIENTIFIC AMERICAN

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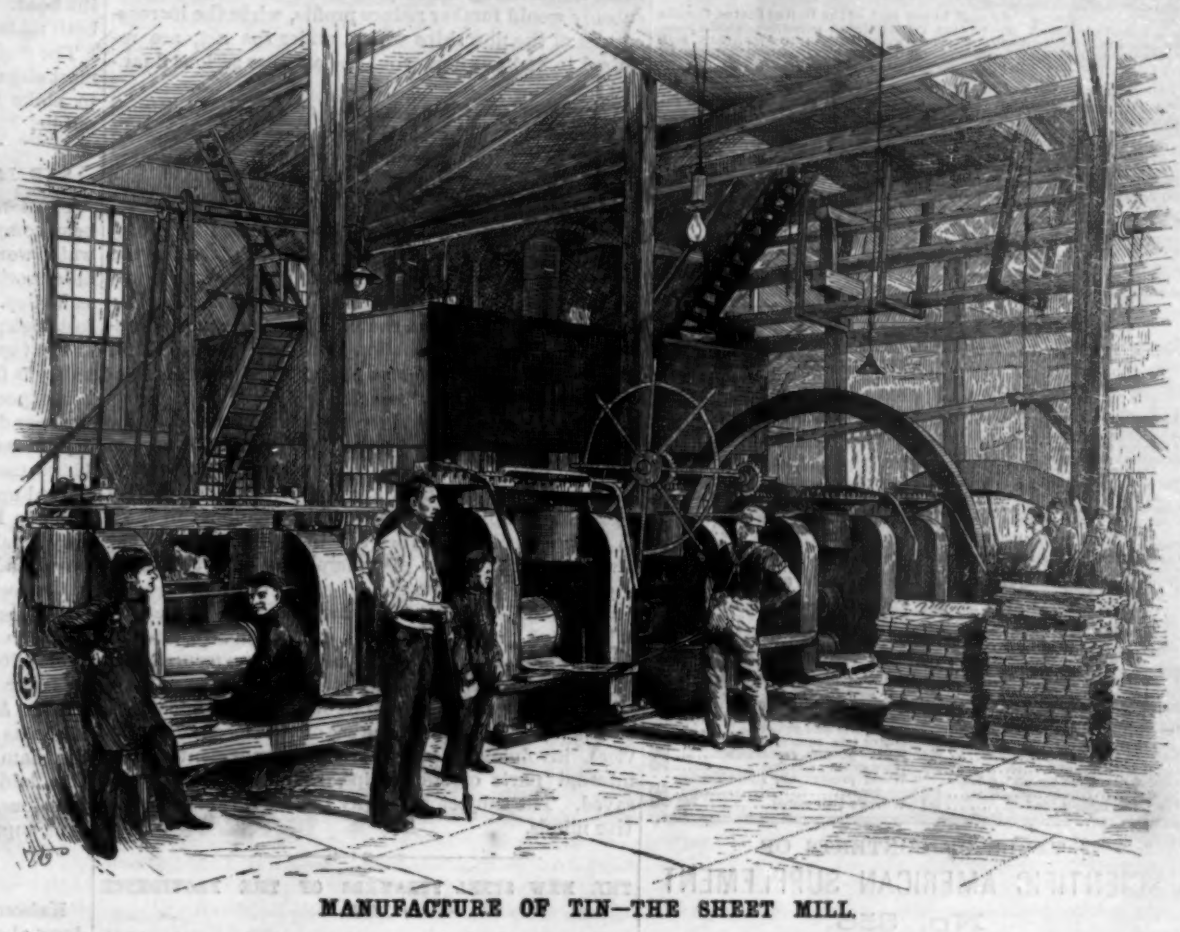
THE MANUFACTURE OF TIN AT ST. LOUIS.

A recent census bulletin gives us various interesting particulars showing the rapid growth of St. Louis as an industrial center. She already stands in the front ranks as a manufacturing district, and a few more years of progress will give her a positive pre-eminence. Among the more recent industries commenced at St. Louis is the manufacture of tin, and, according to the *Iron Age*, to which we are indebted for the following particulars, the enterprise presents every prospect of permanent success. The works here illustrated are those of the St. Louis Stamping Company.

The works have been completed at a cost of $250,000 for the tin plate mill alone, but, including forge, bar mills, warehouses, etc., the investment is over $400,000, and we take pleasure in laying before our readers views of the different departments taken from photographs.

The St. Louis tin plate plant comprises a sheet mill 150 ft. long by 100 ft. wide, an annealing department 150 by 65 ft., and a tinning department 250 by 60 ft. The steel plate bars are made in the other departments of the works. In the forge mill the billets and bars are prepared and rolled to suitable thickness, width, and length, after which they are taken to the tin plate works, where they are reheated and rolled to about No. 16 gauge. They are then doubled, rerolled three times, and sheared to the different sizes. The doubler and shearer used by the company is of their own design, and is in use nowhere else. An upright bar, jointed at its base, has two arms, one forming the doubler and the other the shearer, which work alternately with the motion of a cam at the top. There are four mills in the sheet mill department, a mill consisting of a roughing and a finishing roll. The sheets are then cut to the size required, after which they are taken to the pickling machine or agitator, to remove the scale and other impurities from the surface of the sheet, and allowed to remain there from twenty to twenty-five minutes. The agitator is capable of pickling sheets for 500 boxes of tin plate a day.

After being pickled, the sheets are taken to the annealing department, where they remain in the furnace for 24 hours. They are then taken back to the rolling mill to be cold-rolled, in order to make their surfaces perfect to receive the coating. After this they are annealed again, and repickled in the so-called white pickle, after which they are placed in water tanks to prevent oxidation, being then ready for tinning. The process of tinning is comparatively simple. The sheets first go to the tinning, next to the wash, and last to the finishing or grease pot, in which they are run through rollers which strip them of superfluous tin. They are then taken to the cleaning boxes and finally rubbed with the woolly side of a sheep skin, after which they are ready to be packed. Ten tinning pots or stacks are now in operation in these works, producing about 350 boxes a day, to which will immediately be added six more, and with these 16 stacks the company will be able to turn out over 600 boxes of tin plate daily. The stacks now in operation are producing



MANUFACTURE OF TIN—THE SHEET MILL.

THE ST. LOUIS STAMPING COMPANY—VIEW IN THE TINNING HOUSE.

half-bright plates, which are largely used in the company's own works, save what are sold to the retail trade. The balance of the production is roofing or terne plates. The roofing plates are all sold to dealers, and the company say that consumers report the plates are much better than English plates of the same grade. It may be of interest to note that the Government Building at the World's Fair at Chicago is covered with these plates. There are 11 furnaces in the annealing department running on sheets for the tinning department, to which will soon be added four more, when sufficient quantities of sheets can be annealed to run the tinning department full. Arrangements have also been completed for the erection of a cold-rolling house, with 12 sets of rolls, for finishing the sheets before they are sent to the tinning house. This will give the company two more mills in the mill proper now being used for cold-rolling, which will increase their capacity about one-third. In addition to the improvements noted, the company is soon to erect a new steel plant, which will be located at Granite City, a new town now being built by the Neidringhaus Bros., opposite the city of St. Louis. The steel plant will produce steel both by the open hearth and Bessemer process, and will contain boiler, stack and nail plate mills. The nail plate mills will be run to prepare plate for the tin plate mills, where they will be rolled to the thin sheets as above described. The company intend to be able to control the entire process of the manufacturing operations step by step, from the production of the steel ingot to the finished tin

(*Continued on page 349.*)

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NEW YORK, SATURDAY, MAY 28, 1892.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 856.

For the Week Ending May 28, 1892.

Price 10 cents. For sale by all newsdealers.

NEW INVENTIONS NEEDED FOR WORKING STEAMSHIPS.

In our last number we gave an account of the recent act of Congress passed for the special registration of the two great British-built steamers, the City of New York and the City of Paris. The proposed transfer of these ships, which are in fact semi-war vessels, to the American flag has excited considerable feeling in England. The transaction is there looked upon almost as if it were an unwarranted capture by the Yankees of a couple of Britain's best vessels. Our cousins appear to feel as if there were something wrong in their laws which permits Americans thus to step in and suddenly deprive them of two such large chunks of maritime prestige.

But according to the views of our London contemporary, *Engineering*, there is not much likelihood, after all, of the realization of the transfer. The authorizing act, it is true, has been passed, but our confrère avers that it will be so much more expensive for the owners to run the ships under the American flag that any actual change is improbable. For example, the wages of American firemen would be nearly double that of the English stokers, and so on through the other items for manning the ships. The loss of the British subsidy would further reduce profits, while the increased cost of the new ships which, under the act, are required to be built here would be another serious financial burden.

There are several companies of American citizens who would like to build steamers here with a view to foreign trade, but they are deterred by the greater running expenses required. Among them is the Corbin company, which aims to establish a line of steamers between Montauk, at the east end of Long Island, and Milford Haven, in Wales, which latter place, by the completion of the Severn tunnel, is now only six hours distant from London, the same as Liverpool. This line offers the shortest ocean route. The company in question asks Congress to allow it to buy foreign ships, man them with foreign cheap labor, and then sail under the American flag.

At present it looks as if recourse must be had to the genius of our inventors for the solution of the problem of ocean steam navigation in American-built steamers. We can build the ships and supply them with fuel nearly as cheaply as anybody; but we cannot run them so economically after they are built, by reason of the lower wage rates that elsewhere prevail. It remains, therefore, for our inventors to study out new and improved modes whereby mechanism may be further substituted for manual labor on ship board, and the costs of operation thereby reduced. The feeding and pay of the army of coal heavers and stokers now required on every large ship is one of the most serious items of expense. Perhaps by the use of new mechanical devices, involving it may be a rearrangement of the internal parts of steamships, much labor could be saved. The subject is worthy the attention of inventive minds.

THE NEW STEEL STEAMERS OF THE PROVIDENCE LINE.

The second of the new screw steamers, the New Hampshire, built for the Providence and Stonington line by the Harlan & Hollingsworth Co., of Wilmington, Del., has just been finished, and has had a trial speed test on the Delaware River. Taking on 600 tons ballast to bring the wheel to immersion line, she made time over the measured mile in 2 minutes 59 seconds, 2 minutes 58⅕ seconds, 2 minutes 57½ seconds, or a speed of over 20 miles per hour. On Saturday, May 7, the New Hampshire made an excursion trip to the lower bay with a company of about 400 guests, who did good duty to an excellent luncheon. Through the politeness of Mr. Samuel J. Clarke, superintending engineer and superintendent of construction of both the Maine and New Hampshire, we have obtained the following details of the boat and engines:

Length over all, 310 ft.; length on water line, 302 ft. 7 in.; beam moulded on load water line, 44 ft.; width over guards, 60 ft.; draught, 12½ ft.; gross tonnage, 2,400; net tonnage, 1,500; hull of steel, with seven steel bulkheads, dividing the vessel into water-tight compartments; propeller screw left-handed, four blades 18½ ft. diameter, 18½ ft. pitch; 18 in. shaft, 130 ft. long, in sections of about 25 ft., with eight thrust bearings of Magnolia metal; maximum revolutions, 100 per minute.

The engine is of the inverted direct-acting triple expansion type, with four cylinders: One high pressure cylinder, 28 in. in diameter; one intermediate, 45 in. in diameter; and two terminal cylinders, each 51 in. diameter, with 42 in. stroke. A surface condenser, of Lighthall type, with a centrifugal circulating pump, and a steam reversing gear. The high pressure cylinder has a single piston valve; the other cylinders each have double piston valves; cranks quartering. The high pressure cylinder takes steam at 160 lb.; 1st receiver, 40 lb. pressure; 2d receiver, 12 lb. pressure; terminal pressure in 3d and 4th cylinders, 6—thus utilizing steam to its utmost expansion. The engine, at 100 revolutions, develops 2,947 indicated horse power, or 1·227 I. H. P. per gross ton.

The action of the quadruple engine tends to a freedom from jar or vibration, usual with our large propellers of this class, making the after part of the vessel an exceptionally quiet part. The roughness and impact of water at the bow make the usual vibration, so that if you want a quiet berth, take an after one.

The boilers, two in number, are of the Scotch type with Purves corrugated furnaces, each 46 × 78 in., aggregating 270 sq. ft. of grate surface. Boilers 13½ ft. diameter, 11 ft. long. A blower service for the fire room and boilers when necessary. The engine room is arranged with all the modern facilities for utility and convenience for every needed service. A powerful fire pump and fire apparatus throughout the vessel. Five bilge pumps constantly working on the crosshead of the air pump. A supply pump for salt water for sanitary purposes. A fresh water supply pump for pressure service. A steam jack for turning over the shaft.

An incandescent lighting system, consisting of two Thomson-Houston dynamos of 350 light power each, driven by separate engines of 20 horse power each. Steam is reduced to 80 lb. pressure for these engines by a reducing valve. An annunciator service throughout the boat. A steam heating service in connection with both main and donkey boilers.

The fitting up of saloons and staterooms is in the most elegant style, and there seems nothing wanting to make the new boats favorites with the traveling public.

THE LARGEST MASONRY DAM IN THE WORLD.

The largest masonry dam in the world has lately been completed in India, in connection with the new water works for the city of Bombay. It is situated 65 miles north from Bombay, and stretches across the Tansa Valley. The dam is about two miles in length; 118 feet high; 100 feet thick at its greatest depth; 15½ feet at the top. The lake which will be formed when the valley is full covers an area of eight square miles, and it is expected will furnish a supply of 100,000,000 gallons per day throughout the year. The dam has been 5½ years in process of construction and from 9,000 to 12,000 men and 800 carts and animals have been employed upon it during each working season from October to May. The difficulties of construction were very great. The sand and cement of which it is composed had to be carted for many miles. Over 14,700,000 cubic feet of rubble stone were used, over 2,200,000 cubic feet of lime, and over 3,300,000 cubic feet of washed sand. The excavations of rock amounted to over 6,700,000 cubic feet. The masonry work in all was over 11,000,000 cubic feet. The contractors were Glover & Co., of Edinburgh. The executive engineer was J. B. Clarke. The water is conducted from the dam to Bombay in iron pipes 48 inches diameter, laid above ground. Each length weighs about four tons. The aggregate weight of the pipes is 50,000 tons, supplied by Macfarlane, Strang & Co., of Glasgow.

Kalsomining.

Kalsomining, or wall coloring in distemper, is best done about this time of the year, when the walls are not too cold or too hot. It may be done, says the *Paint and Varnish Journal*, any time during the winter, so that the walls do not freeze. There are a good many preparations put up for this purpose and called by various names. However, if you are where you cannot procure this, it may be prepared in following manner: White—To 10 pounds best whiting use 1½ pounds white glue, ½ pound alum and a little ultramarine blue. Put the glue in cold water, set it on the fire and stir until dissolved. Put about half a gallon of hot water over the whiting, and when dissolved add the glue, the blue and the alum, which must also be dissolved in hot water. Stir this mixture well and run through a sieve. For first coating this may be used while hot, but the other coats must be cold. If your color works too stiff, a little soap will help. All colors and shades are made by adding the dry colors. Before kalsomining, the crack and nail holes should be filled with plaster of Paris. Mix this with paste, and it will not dry so quickly. If you have a good brush and work as quickly as possible to avoid laps, you will have a good job of kalsomining. A nice stencil border run around the top of wall makes a nice finish.

Natural Gas at Salt Lake.

Natural gas has been discovered on the shore of the Great Salt Lake, within ten miles of Salt Lake City, and a large company has been organized to utilize and develop the fuel. Several wells have already been put down to the depth of 650 feet, and it is said that 50,000,000 cubic feet of gas are now flowing daily. A new town, to be named Woodman, has been laid out on the site of the wells, and a new railway is to be extended to Salt Lake City. A smelting establishment, to cost from between $1,000,000 and $2,000,000, is shortly to be erected, and a large glass factory is also projected.

Remarkable Water Powers.

Altogether the most extraordinary water power installation—so far as head is concerned—ever known has recently been made by the Pelton Water Wheel Company, in one of the famous Comstock mines, at Virginia City, Nevada. The wheel is 36 inches diameter, made of a solid steel disk with the buckets riveted on to the periphery in a way to afford absolute security, weighing complete 180 pounds.

It is running under a vertical head of 2,100 feet, equal to 911 pounds pressure, 460 feet of this head is obtained from the pipe line of the Gold Hill Water Company and the remaining 1,640 feet from the California and Con. Virginia shaft, down which the pipe line is run to the Sutro tunnel level, where the power station is located, and through which the water discharges after passing over the wheel. The wheel runs at 1,150 revolutions, with a peripheral speed of 10,804 feet per minute, or about 120 miles per hour.

The construction of the wheel amply provides for the centrifugal strain the velocity of the water gives it, running without load, when it would attain the enormous speed of 21,608 feet per minute, equal to about 240 miles per hour. A nozzle tip one-half inch diameter gives under above conditions 100 h. p. Every miner's inch of water, equal to a flow of 1·6 cubic feet per minute, gives 5 h. p., while 1 h. p. is given for every 2 lb. of metal in the wheel. It is only by comparison that an idea can be obtained of the height of a column of water due to such pressure. It is more than four times as high as the Washington monument and considerably more than twice the height of the Eiffel tower. It is safe to say that no water wheel has ever before been operated under any such head, nor any such demonstration afforded of the velocity and power of water under such an extreme pressure.

The installation made by the Pelton Company some two years ago in the Chollar shaft on the Comstock lode is in some respects no less extraordinary. This consisted of six 40 in. Pelton wheels, which run under a vertical head of 1,680 feet, driving that number of electrical generators, the power from which is conveyed up the shaft to the Nevada mill, some 2,000 feet distant. These wheels only weigh 230 lb. each, and with nozzle tips 5/8 of an inch diameter develop 125 h. p. each.

The water is first run over a Pelton wheel on the surface under 460 feet head, and is then carried down the shaft by a pipe to the Sutro tunnel level, where the underground station is located, the power from the electrical generators being conveyed to the countershaft of the mill with which the surface wheel is connected, the two distinct forces working together in perfect harmony.

A most interesting illustration of the double use of water is here given, some 400 h. p. being produced in this way from what may be termed waste water. This station has now been running more than three years without interruption and practically without expense in the way of repairs, as well as without any appreciable loss of efficiency, affording a most striking example of the advantages of water power, both by direct application and electric transmission, as well as the reliability of such a plant under such extraordinary conditions.

New Antiseptics.

Among new antiseptics from coal tar derivatives, says S. A. Walton, may be mentioned pyoktanin, methyl-violet, the most antiseptic of the aniline colors. A solution of 1 in 1,000 is used in various eye diseases, phthisis, ulcers, etc. There is a yellow variety commonly known as auramine, also used antiseptically.

Lysol is a saponified phenol derived from cresols, and contains the higher homologues of carbolic acid. It is said to possess higher antimycotic power than carbolic acid, and to be less poisonous. This preparation is much used in Germany at the present time.

Retinol, a distillation product of pine resin, is a viscid fluid hydrocarbon. It is a non-irritating and stable antiseptic.

Europhen, iso-butyl-ortho-cresyl-iodide, contains 20 per cent of iodine, and is non-poisonous.

Dermatol, a basic gallate of bismuth, forms a powerful antiseptic and dessicant.

Sulphaminol, thio-oxydiphenylamine, the antiseptic action of which is due to its decomposition in contact with the fluids of the body into sulphur and phenol.

Monochlorphenol is prepared by the action of chlorine on cooled phenol. It is a powerful antiseptic and less irritating than trichlorophenol.

Camphoid, though only a mild antiseptic in itself, is a valuable adjunct to this class of bodies, as it forms a ready method of applying antiseptics to the surface of the skin, and owing to its composition (of spirit, camphor and pyroxylin) it forms a valuable solvent for substances such as salicylic acid, resorcin, hydronaphthol and many others.

A Great Weed.

The wild potato vine (*I. pandurata*) sometimes has a root that attains the size and occasionally the form of a boy's body, and weighs thirty-five pounds.

Kite Electricity.

A notice under the above heading, published in the SCIENTIFIC AMERICAN for November 14, 1891, induces me to write down a theory which I adopted some thirty years ago, and have been teaching since then, because it fully explains several facts which formerly have been a stumbling block to the right understanding of many phenomena presented by atmospheric electricity.

Among them is the fact that a kite held by a conductive string (made so by one of the strands being a fine copper or brass wire), when it is made to ascend in a clear, dry, and cloudless atmosphere, with apparently not the least tendency to a thunderstorm in it, will always, without exception, show positive electricity, and more of it in proportion as the kite ascends higher. When a hollow metallic ball is attached to one end of a fine wire, of which the other end is connected with a proper electrometer, and the ball is thrown upward in the free open air, the electrometer will show positive electricity, and may be made to retain it for a short time when the wire is attached in such a way as to become separated from the electrometer when the ball has reached its highest point. A lightning rod arranged at its lower end in such a way that its ground connection can be interrupted will, during or before a thunderstorm, while clouds are floating over it, show alternately positive and negative electricity, but when the sky is clear and dry its electric charge is always positive. Of this I had the rare opportunity to satisfy myself by a multitude of experiments on several occasions. De Saussure repeated many more experiments in the Alps, and found always, even in the highest accessible regions, positive electricity when the sky was clear.

The conclusion arrived at, as published in the works of Biot and other eminent investigators, was that the dry, clear atmosphere was always charged with positive electricity, and this in a greater amount in proportion as we ascend higher.

This explanation was sufficient until Biot, during his famous scientific balloon ascension with Gay-Lussac, lowered a metallic globe suspended by a copper wire from the car of his balloon, and found very strong negative electricity in the higher regions. In his description of this experiment he confesses that this is contrary to what De Saussure found in the higher regions of the Alps. He tries some kind of explanation in the second volume of his "Traité de Physique," but as he, like all the electricians of his time, adhered to the theory that the air itself was charged with the electricity which acted upon the electrometer, there was a quandary left to be solved.

The credit of doing this belongs to Peltier, whose theory is that our terrestrial globe is always permanently charged with negative electricity, which, according to the law of its distribution, resides principally in its surface, and which, when the air is dry, and therefore a good insulator, will not be communicated outwardly, but will act by induction upon any conducting body insulated above the surface and cause its lower end or under side to become charged with the opposite (positive) electricity, while its upper end or top side will become charged with the similar (negative) electricity, and this by the separation of the two electricities, positive and negative, which are contained in and neutralize one another in all conducting bodies which are not so influenced. Consequently, where a rod or wire extends from the earth's surface upward, its lower end must become positive and its upper end negative by the inductive capacity of the negative earth, and this explains at once the dilemma why Biot, in his balloon, in testing the upper end of the wire, found negative electricity, while the observers on the earth's surface testing the lower end found positive electricity. The fact is that it was not the electricity absorbed from the air they had to deal with, but with electricity developed in the wire itself, by the inductive influence of the earth's constant negative charge.

I ought not to omit here the statement that Sir William Thomson (in proceedings of Royal Institution, May 18, 1860) declares that he does not agree with Peltier in regarding the earth as a negatively charged conductor. Still he admits at the end of the same explanatory paragraph that "the result we obtain every day of fair weather in ordinary observations on atmospheric electricity is precisely the same as if the earth were electrified negatively and *the air had no electricity in it whatever.*"

Recently some other English investigators have gone a step further, and striking from the last suggestion of Sir William Thomson, have come to the conclusion that actually dry air at the normal pressure of one atmosphere does not and cannot contain an electric charge; also that it cannot conduct nor convey electricity, but only be perforated by the electric spark, as we do in our laboratory experiments, and which nature does in her gigantic laboratory by a flash of lightning.

This theory, striking as it is, and contrary to the usually adopted notions, is likely to prevail, as it explains fully and satisfactorily two phenomena not otherwise possible of explanation: The cause of a sudden clap of thunder from a cloudless sky and the gradual formation of a highly charged thunder-cloud in very high regions of the atmosphere. This will be the subject of a future communication.

P. H. VANDER WEYDE, M.D.

Trees.

What a strange underground life is that which is led by the organisms we call trees! These great fluttering masses of leaves, stems, boughs, trunks, are not the real trees. They live underground, and what we see are nothing more nor less than their tails. Yes; a tree is an underground creature, with its tail in the air. All its intelligence is in its roots. All the senses it has are in its roots. Think what sagacity it shows in its search after food and drink. Somehow or other, the rootlets, which are its tentacles, find out that there is a brook at a moderate distance from the trunk of the tree, and they make for it with all their might. They find every crack in the rocks where there are a few grains of the nourishing substance they care for, and insinuate themselves into its deepest recesses. When spring and summer come, they let their tails grow, and delight in whisking them about in the wind, or letting them be whisked about by it; for these tails are poor passive things, with very little will of their own, and bend in whatever direction the wind chooses to make them. The leaves make a deal of noise whispering. I have sometimes thought I could understand them, as they talk with each other, and that they seem to think they made the wind as they wagged forward and back. Remember what I say. The next time you see a tree waving in the wind, recollect that it is the tail of a great underground, many-armed, polypus-like creature, which is as proud of its caudal appendage, especially in summer time, as a peacock of his gorgeous expanse of plumage.

Do you think there is anything so very odd about this idea? Once get it well into your heads, and you will find that it renders the landscape wonderfully interesting. There are as many kinds of tree tails as there are of tails to dogs and other quadrupeds. Study them as Daddy Gilpin studied them in his "Forest Scenery," but don't forget that they are only the appendage of the underground vegetable polypus, the true organism to which they belong.—*Dr. O. W. Holmes.*

Generals Hawley and Hurst as Inventors.

Senator Teller has proposed an amendment to the naval appropriation bill, appropriating $50,000 to enable the Secretary of the Navy to have constructed one 8 inch 50 caliber steel rifle, firing a high explosive projectile of great velocity. In order to test the gun, the secretary is authorized to use the $50,000 appropriated in March, 1889, for testing guns for secondary batteries. The amendment stipulates, however, that no part of the money shall be expended until the owners of the patent of the gun agree to construct them exclusively for the government. The gun is known as the Hurst high explosive 8 inch rifle, and is the result of five years' experiments begun at the navy yard in Washington by the inventor, and conducted in private by him. In the experiments Senator Hawley, of Connecticut, took a prominent part. He has great faith in the two charges of powder, one of the difficulties to be overcome being in providing a suitable gas check for the projectiles. This General Hawley succeeded in patenting, and at first took the patent out in his own name and afterward on joint invention with General Hurst. The gun provided for by the proposed amendment will fire the Hawley projectile, which will be filled with dynamite, gun cotton or some other high explosive, and have, it is said, a range greater than that of any gun of similar caliber constructed in this or any country.—*Army and Navy Register.*

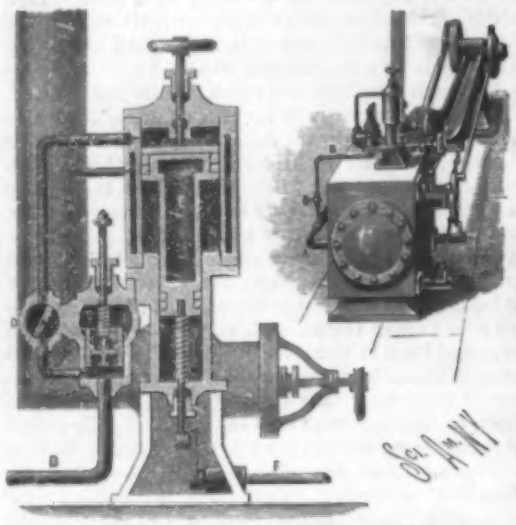
A Queer Case.

Three fifteen-year-old patent applications of Thomas A. Edison for telephone transmitters went to issue last week, after such long delay that the English patents, applied for after the American, had been examined, granted, gone to issue, run their term of 14 years, and expired before the American patents were issued. It is a nice legal question whether these patents had not expired by limitation of law before they were issued. The courts will probably so hold. There is not so much ground for suspecting intentional and fraudulent delay in the interference proceedings as there was with the Berliner patent, issued some months since, but we concur with the *Engineering News* in their opinion that such decisions are a great reproach to our patent practice and to the state of the law.

FROM the last annual report of the Bell Telephone Company, it appears that the number of instruments in use at the close of the year 1891 was 312,407—a large increase over the previous year. The total earnings for the year were $4,875,290. The expenses were $1,505,872, leaving the net earnings at $2,869,418. The extension of the long-distance telephone system is rapidly progressing.

AN IMPROVED STEAM ENGINE GOVERNOR.

A governor which is positive in operation, and designed to admit steam quickly and in proper proportion to overcome the resistance of any load carried, as well as to shut off the steam and prevent undue increase of speed after release of the load, is shown in the accompanying illustration, and has been patented by Mr. Richard J. McIlhenny, of Wilmington, N. C. The ends of the engine cylinder are connected with pipes leading to a valve casing in which is a valve stem, sliding longitudinally on seats in the casing, and the latter is connected with a pipe, A, from which leads



McILHENNY'S STEAM ENGINE GOVERNOR.

the valved pipe, B, opening into a cylinder containing an equalizing valve, C. The lower end of the latter cylinder is connected by a pipe, through the valve, D, controlled from the equalizing valve, with the upper end of a cylinder, E, containing a piston whose upward movement is limited by a screw rod. The piston has on its under side a piston rod extending into a cylinder of less diameter, connected by a pipe with the steam supply pipe, while the stem of the piston rod, extended through a stuffing box, is connected with a crank arm on a shaft, F, carrying arms connected with valves regulating the supply of steam. The equalizing valve is provided with an auxiliary valve, which permits the steam to escape from above the valve at the time the engine cuts off and steam is expanding. By this improvement the initial pressure in the engine cylinder operates a piston which controls the movement of the steam inlet valve. The cylinder of the governor is preferably steam-jacketed, as shown in the sectional view, and the governor is intended to be set on top of the engine cylinder, as shown in the small view in perspective. The device is designed to be equally applicable to high or low pressure, stationary or marine engines.

THE PENDULINE TITMOUSE.

Of all the titmice of France, this, with the whiskered pannrus, is the rarest and least known; and it is for this reason that we devote the present article to it.

The under side of the head, the throat and the neck of the male are white, sometimes grayish. The lower part of the back and the tail coverts are of an ashen russet. The breast is gray, variegated with rose color; the forehead and the cheeks are of a brownish black; the remiges and the retrices are blackish, bordered with reddish white; the eye is brown; the bill is of a more or less pronounced black, and the feet are gray.

The female differs from the male in color only in her lighter tints and in the less extended black of the cheeks.

This charming little bird, which is only four inches in length, is remarkable for its vivacity, its agility, and its boldness, but it is at the same time so wary that it incessantly conceals itself from the eye of the hunter and is with difficulty taken in traps.

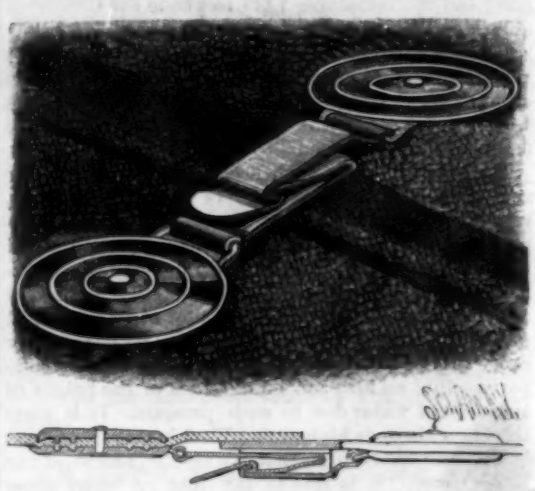
Temminck, who established three divisions in the genus *Parus*, placed the bird under consideration in that embracing the inhabitants of river banks. It is, in fact, upon the sides of ponds and amid reeds that it exclusively lives, and it is never met with in any woods except those that are situated in marshy places. It lives among reeds, of which it eats the seeds. It also feeds upon insects and their larvæ. As active as the other titmice, it suspends itself from the reeds and hides itself among them so completely that its cry is often heard without the bird itself being perceived.

In autumn, the birds congregate in small flocks of from three to six individuals, but stop only in humid places. The art that this bird introduces into the construction of its nest has for a long time attracted the attention of naturalists. "I have given it," says Buffon, "the name of *penduline*, which represents to the mind the construction of its nest." This nest, in fact, is the most curious of any of those of the rest of the birds of France, and can be compared only to the nest of certain species of weavers of India and Africa; for it is shaped like a purse, is fixed by its upper extremity, and is suspended in most cases over water.

Baldamus (*Naumannia*, I., p. 50) gives a very accurate description of it: "The male and female display great ardor in constructing their nest, and yet it is difficult for one to understand how they finish such a work in less than two weeks. The bird begins by selecting a slender pendant branch having several bifurcations at a short distance from its point of origin. It surrounds this with wool or more rarely with goats', wolf's or dog's hair or filaments of bark. Between the branches of the bifurcation it fixes the sides of the nest, weaves them until they extend sufficiently beneath these branches to be attached below one to the other, and thus form a flat flooring. The nest thus roughly outlined resembles a basket with flat sides. The external walls are afterward solidified. To this effect, the bird makes use of the down of poplars or willows, which it agglutinates by means of its saliva and which it fixes with filaments of bark, wool and hair. The nest then presents the form of a rounded basket. At this moment, the bird begins to construct a small, lateral, circular aperture. This, however, is not the only one, for the nest has two openings. One of them is provided with a passageway from one inch to three inches in length, and the other remains open. One of the apertures is closed later on. However, I have seen a nest in which this aperture had not been stopped up. Finally, our bird places in the bottom of its nest a layer of vegetable down about an inch in thickness, and the construction is finished."

We must remark, however, that we have seen a certain number of these nests that exhibited quite perceptible differences in form from each other, due no doubt to the materials employed and the places where the nests were suspended. They have generally the form of a purse of from six to nine inches in length and from four to six inches in diameter. The entrance, which pretty accurately resembles the neck of a bottle, is sometimes horizontal and sometimes oblique.

It is in this charming cradle that the bird lays from five to seven pure white eggs, of elongated and cylindrical form. This bird is not common in France. It has been killed only accidentally in the north and east. It takes up its quarters in summer in the neighborhood of Pezenas. It is found likewise in the departments of Aude, Eastern Pyrenees and Gard, and especially upon the banks of the Rhone. The true country of this bird, which is known scientifically as *Ægithalus pendulinus*, is Russia, Lithuania and Galicia. In these countries its curious nest naturally strikes the superstitious with astonishment, and so therapeutic properties are ascribed to it. The naturalist Radde says that, among the Mongolians, the smoke given off through the burning of a piece of the nest is inhaled for the cure of intermittent fever. A nest



MOODY & PITCHER'S BLANKET FASTENER.

softened in warm water cures rheumatism, it being only necessary to apply it to the painful spot.

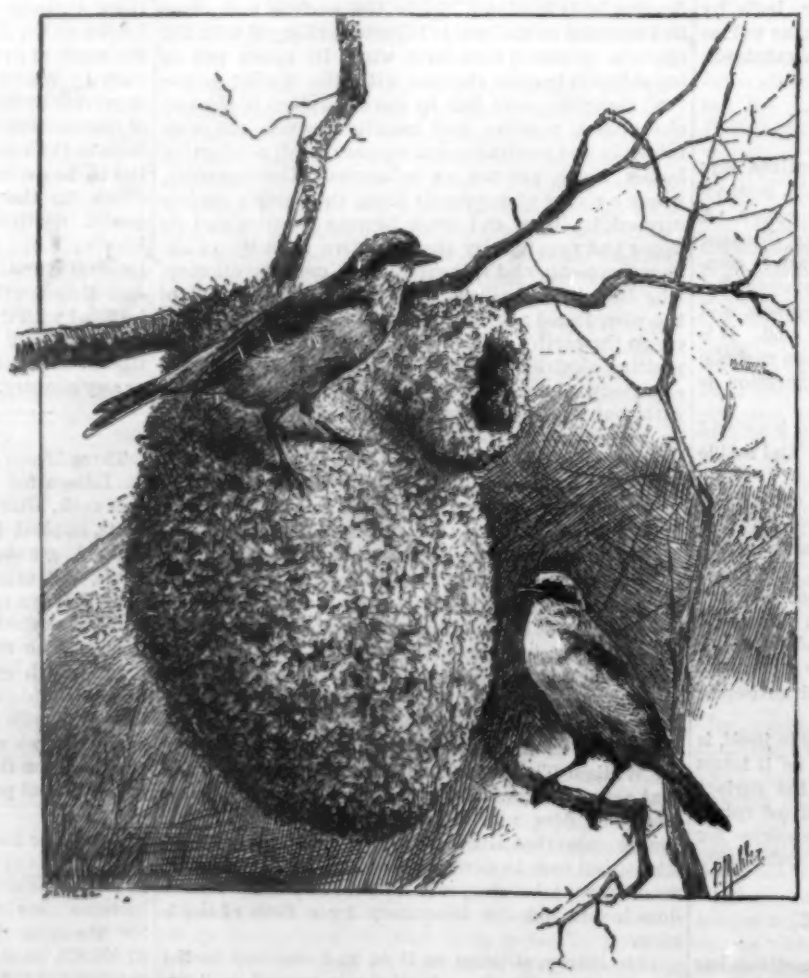
Everrmann says that the "nest of this bird is regarded in Russia as very efficacious against all sorts of maladies, especially fevers and epizooties, which it has the property of warding off. A peasant of Astrakhan came one day to Kasan with a wagon load of these nests."

Finally, in the fens of the environs of Bologna, the simple-minded have a superstitious veneration for these nests, each hovel having one of them hanging near the door. The owners regard them as genuine lightning conductors, and the little architects of them as sacred birds. In that part of France in which the bird builds its nest we happily do not meet with such ingenuous prejudices.

This bird has sometimes been preserved in captivity by feeding it upon a pasty of nightingales' mixed with ants' eggs; but, like all other titmice, the bird is so restless and so active that it cannot long survive the loss of liberty.—*Le Naturaliste.*

A SIMPLE HORSE BLANKET FASTENER.

The device shown in the engraving is designed to be readily attached to the fabric without tearing it, and facilitates the quick and easy opening or closing and holding together of the edges of the blanket to which it is attached. It has been patented by Messrs. George A. Moody and Charles H. Pitcher, of Red Bank, N. J. Each of the holders is formed of two plates, or disks, having circular corrugations on their faces, one of the plates being on the front and the other opposite on the back of the blanket, the two plates being united by means of a central rivet, or by prongs projecting from one plate through apertures in the other, the prongs then being clinched. Engaging a loop on each holder is a fastening member, one of which is in the shape of a flat spring with a part doubled up to form a tongue, from which a finger piece bends outward. The other fastening member has a lip adapted to be engaged by the tongue, as plainly shown in the sectional view. To unlock the members they are moved slightly toward each other, when an inward pressure upon the finger piece disengages the tongue from the lip. Instead of a lip being formed, as shown, upon one of the fastening members, it may be provided with an aperture adapted to receive the tongue of the other member, the operation being substantially the same in both cases. This fastening may be conveniently opened or closed, but is not liable to open accidentally.



THE PENDULINE TITMOUSE, MALE AND FEMALE, AND THEIR NEST.

LEAD pencils were first used in 1594.

TEA KETTLE ANDIRON.

The apparatus represented herewith seems destined to replace to advantage the tea kettles that are usually placed before the fire in order that hot water may always be at one's disposal. This andiron is entirely hollow, so that it may be filled with water. A cock placed at the side permits of drawing off the water in measure as it is needed.

If it is desired to convert the apparatus into a hot water bath, it is only necessary to remove the cover

TEA KETTLE ANDIRON.

and to immerse in the boiling water the vessel containing the liquid to be heated.

It is very easy to give the apparatus an artistic form that will permit of its being utilized in any fireplace.—*Les Inventions Nouvelles.*

A TRAIN OF COMPOUND LOCOMOTIVES.

The Baldwin Locomotive Works recently shipped by the Lehigh and Wabash Despatch a novel train, consisting entirely of compound locomotives. The motive power was furnished by the compound ten-wheel locomotive No. 82, which has become famous for its remarkable performances on the Pennsylvania, the Norfolk & Western, the East Tennessee, Virginia & Georgia and Chicago, Burlington & Quincy Railroads. This engine is of the Vauclain four-cylinder system, with high pressure cylinders 14×24 and low pressure cylinders 24×24, driving wheels 72 inches diameter, total weight of engine in working order about 133,000 pounds, weight on driving wheels about 100,000 pounds, total weight of engine and tender in working order 200,000 pounds, total wheel base 24 feet 2 inches, driving wheel base 12 feet 6 inches. This engine will undergo further tests on the C., B. & Q. and C., R. I. & P. and M. P. Railroads after its arrival at Chicago. The train which it hauled consisted of 20 compound locomotives of the Vauclain system, intended for the equipment of the Chicago & South Side Rapid Transit Railway, otherwise known as the Alley Elevated Road. The aggregate weight of the 20 engines comprising the train was 1,000,000 pounds, exclusive of the live engine hauling the train above described.

These engines for the Alley road were built in accordance with specifications prepared by Mr. R. I. Sloan, chief engineer, and Mr. D. L. Barnes, consulting engineer, of the South Side Railroad. They combine novel features, which are believed will make them better adapted to elevated service than any locomotives heretofore in use. The compound system practically does away with loud or offensive noise from the exhaust and prevents throwing of sparks or cinders. By the use of anthracite coal, all show of smoke is avoided. The engines weigh in working order about 58,000 pounds, and have about 40,000 pounds on drivers. They are intended to haul five-car trains, making an average rate of speed, including stops, of 20 miles per hour; and a maximum speed between stations of from 25 to 30 miles per hour. The amount of work required by this performance can be appreciated when it is understood that the stations are at the rate of three per mile.

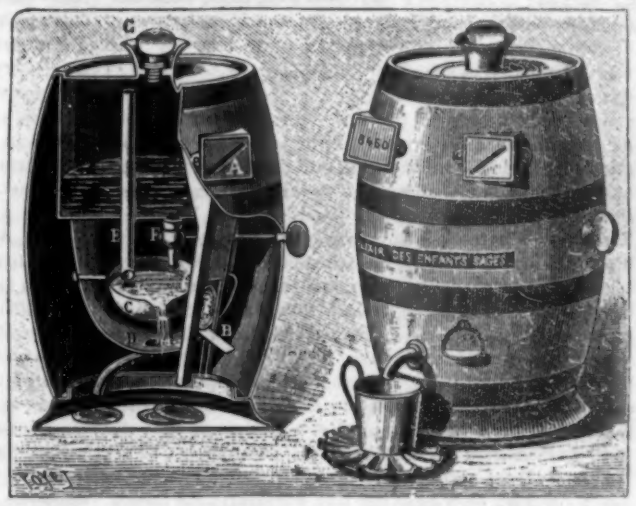
The movement of this train required three sets or relays of engineers and firemen, working eight hours each, to enable the train to run night and day without other stops than necessary for coal and water. Pilot engineers were taken over each division of the lines traversed by the train. Seven engineers or machinists acted as messengers, to see that the train ran cool, and to avoid possibility of accident. The whole train was in charge of Mr. W. J. McCarroll, assisted by Mr. Jerome J. Parmelee and Mr. H. Burall, traveling engineers employed by the Baldwin Locomotive Works. Mr. Burall took charge of the tests of the compound engine 82, and Mr. McCarroll and Mr. Parmelee attend to putting the elevated locomotives into working order and conducting tests of their performance on the road.

TOY AUTOMATIC DISTRIBUTER OF LIQUIDS.

With the object of producing a new scientific toy, and also, it must be confessed, of popularizing automatic distributers and making the use of them general, the French Society of Popular Fountains has devised and put on the market for holiday gifts of the present year an ingenious apparatus that we think it our duty to make known to our readers.

Although the first models, hastily constructed, do not operate with all the regularity desirable, the principle upon which they are based remains none the less curious and capable of giving good results, with better constructed apparatus, for the holiday season of next year.

The toy presents externally the aspect of the apparatus that we have already described,* but operates through a much simplified mechanism, based upon the principle of the fountain of birds. To this effect, the liquid to be distributed, called "Elixir for Good Children," is contained in a cylindrical reservoir contained in the keg. It is introduced through the aperture, G, which it is necessary to close hermetically by screwing down tightly the plug that serves as a stopper. This reservoir is provided beneath with an aperture fitted with a cock, F, through which the liquid flows in sensibly equal proportions. This cock is closed during the operation of filling, and opened immediately afterward. A vertical tube, E, is soldered in the reservoir, and its upper extremity debouches therein, while its



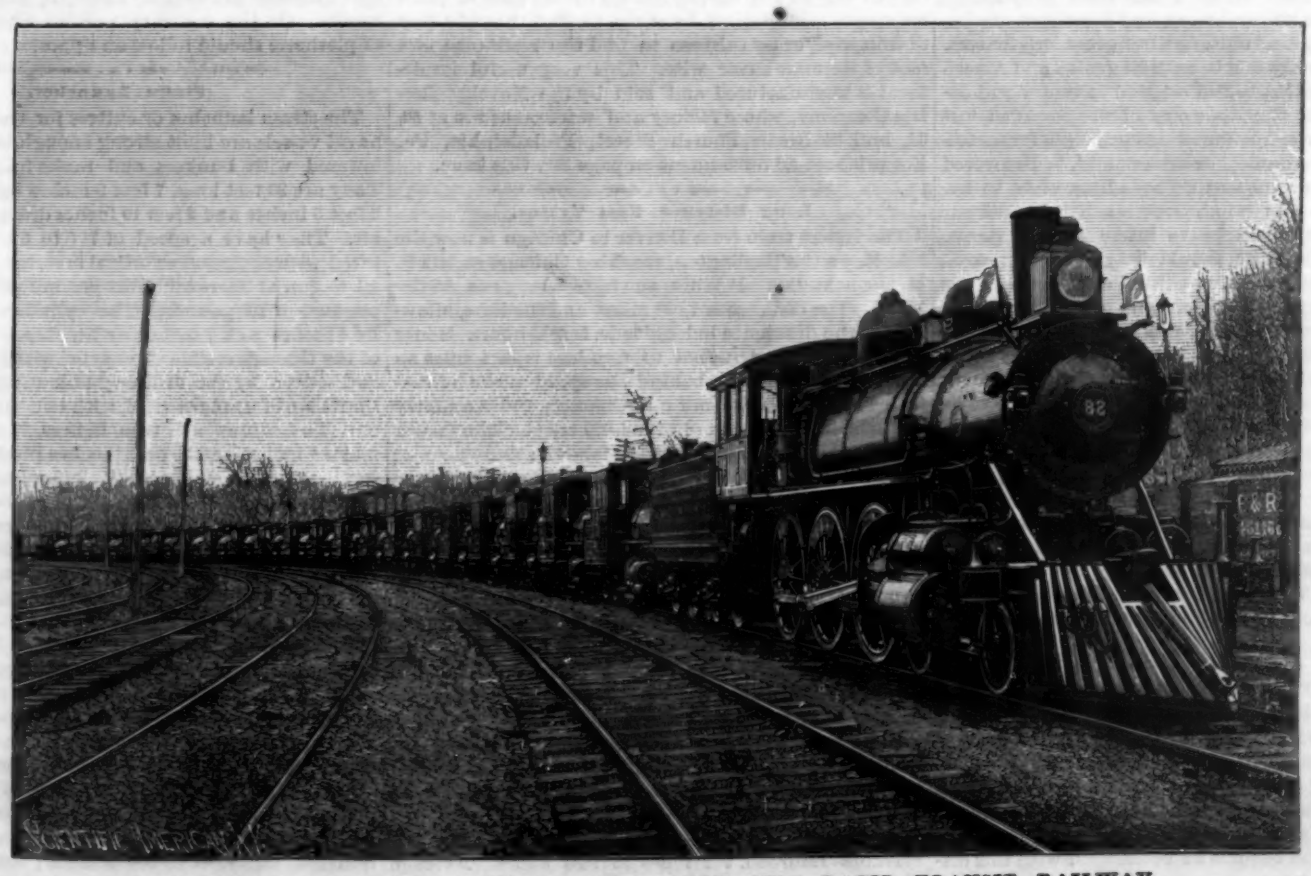
TOY AUTOMATIC DISTRIBUTER OF LIQUIDS.

lower ends in the interior of a hemispherical capsule, C, capable of tilting. If a cent be placed in the slot, A, it will fall at B upon a lever fixed to the capsule. The latter, in tilting, empties the liquid that it contains at D, whence it makes its exit and flows through a tube into a small cup placed alongside of the keg. On tilting, the capsule opens the lower extremity of the tube, E, which dips into the liquid. During the tilting there is, therefore, a certain quantity of air introduced into the cylindrical reservoir, and this permits a certain quantity of liquid to flow through F and fill the capsule anew just at the moment at which the lower extremity of the tube, being closed by the liquid, no more air can enter the reservoir, and this arrests the flow. The capsule then remains filled with liquid until another coin is introduced into the slot.

The keg rests upon a base, forming a money box, into which the coins fall.

It may be conceived that such an apparatus requires to be perfectly immovable in order to work properly, and that it is impossible to obtain equal volumes of liquid at each operation, since the conditions of equilibrium and the rapidity of flow are not the same, according as the reservoir is full or nearly empty. It is possible, however, by regulating the level of the lower extremity of the tube, F, dipping into the capsule, C, to modify in a certain measure the quantity of liquid discharged through the introduction of another coin into the slot, A.—*La Nature.*

*SCIENTIFIC AMERICAN, Dec. 26, 1891, p. 423.



LOCOMOTIVES FOR THE CHICAGO AND SOUTH SIDE RAPID TRANSIT RAILWAY.

[FOR THE SCIENTIFIC AMERICAN.]

Future Inventions and Improvements.

Judging the future from the past sixty years, we may reasonably expect wondrous developments in genius and science. Railroading, telegraphing, ocean navigation, were then engaging a few advancing minds, with predictions of failure, and yet success has attended each of these wondrous enterprises; and probably no one then anticipated crossing the Atlantic inside of six days, or sixty miles an hour by rail, or of telegraphing around the globe, yet these have long since been successfully accomplished. But little was then known of electricity or of its power of transmitting messages, and not until many years after messages were transmitted did any one anticipate the running of cars through our cities by its wondrous power. At our 1876 centennial at Philadelphia, an electric light was exhibited as a curiosity, and now nearly all of our cities are so lighted, and Mr. Edison has given the world the incandescent light for the interior of our dwellings and buildings. The storage battery is now being so perfected that we may reasonably look for its being employed to convey passenger cars over our common railroad tracks, and even to be used in place of the steam engine for freight trains. The public are more credulous now than sixty years ago. Aerial navigation is no doubt an accomplishment of the future, and when some supposed crank says that he is going across the Atlantic in an air ship, don't discourage him nor predict a failure, as they did poor Fulton with his first American steamer.

Electric light and heat is no doubt an accomplishment for not only lighting but warming our homes, and to be produced by a small windmill on our roofs, which may run a dynamo and produce these elements and store them in our attics, to be used at pleasure and at a nominal cost of production. All of the so-called lost arts are to be restored, Damascus steel being among the most useful of them all. Then comes tempered copper; but from what I saw of tempered copper tools in England, in 1869, I think that its usefulness has been greatly overrated, and I have been of opinion that steel tools in place of tempered copper were used in chiseling ancient obelisks and granite, but that rust has destroyed them, while the copper have remained as they were used.

Certain colored glass is very desirable for ornamentation, but not so very useful as steel for choice implements.

And now our sculpturing is approaching the Grecians. We have had our Powers in the Greek Slave, and in sculptured heads are nearing the ancients. In painting, we appear to be behind Raphael and Michael Angelo and many others of the old masters.

In architecture we are as yet mere imitators in structure, except in bridge architecture. Ancient architecture never spanned Niagara nor built a Brooklyn bridge. Our scientific architects and inventors are becoming not only grand imitators but great originators. And this is not only due to natural genius and America's liberal protection to the original inventor and designer, but also to the discovery of the so-called lost arts. And whenever any important principle for usefulness, whether mechanical or ornamental, is discovered or invented, it opens a vast field for thousands to improve, as each one of the improvers is entitled under our protective laws to an exclusive interest in his rights. Our present patent laws should be greatly improved to still encourage inventive genius, and our Congress should look more to the encouragement of inventions than to many of our useless laws. And to-day our Patent Office bureau is more neglected than any other one of our departments, and is the only department that pays, and now I believe has over $3,000,000 to its credit in the United States Treasury. We have abundant skill for examiners, and why keep a poor inventor often four to six months even to have an examination of his case.

Inventors have combined and held important meetings and petitioned Congress for reforms in this terribly neglected matter, and still nothing is done for relief. But, as we truly live in a great age for advancement, we can but still hope and work to win.

J. E. EMERSON.

The Measles Bacillus.

Dr. Canon and Dr. Pielicke, of the Moabit Hospital, the former of whom was one of the first to demonstrate the presence of the influenza bacillus in the blood, have now turned their attention to measles, and it is reported that they have been so far successful that they have been enabled to demonstrate the presence of a specific bacillus in connection with this disease.

This discovery has naturally attracted considerable attention; for although *a priori* we should expect measles to be the result of the action of such a germ, we have hitherto been unable to associate it directly with any such causal agent. In fourteen patients they have succeeded in finding what they assume to be a specific bacillus in the blood, in the expectorations, and in other secretions. This bacillus is stained with methylene blue in the same way as the influenza bacillus, the coloration being specially intense at the ends. The different individuals differ considerably in length, being from one three-thousandth to one one-thousandth of an inch. Its characteristics are said to be different from those of any other bacillus known, and artificial cultures have already been obtained. If once we are enabled to study the life history of this organism, there seems to be a possibility that we shall be able to take some efficient steps in the protection of children against this disease. The further observations on this organism and on its power of producing the disease will be awaited with additional interest from the fact that it appears to be so like the influenza bacillus in its distribution, and also to a certain extent in the effect it produces, in spite of the fact that it is very different in structure and appearance from the influenza organism. —*Lancet.*

AN IMPROVED POCKET WIRE GAUGE.

The little implement shown at full size in the illustration is finely finished in German silver and is designed to be a great convenience to electricians, linemen, and all having occasion to use wire for any electrical purpose. By placing the wire in the V-shaped opening between the movable arm and the edge of the gauge, and moving the arm around until the wire is closely held, the shoulder of the arm and its radial line will indicate: 1. The American or Brown & Sharpe gauge of the wire, (2) the safe current it will carry in amperes, and (3) the ohms resistance per foot of copper wire. Then, by formula as stamped on the arm, may be readily determined the size of wire required to carry any number of lamps, any distance. The figures on the front of the gauge, near the center, indicate the Brown & Sharpe wire gauge, and those on the outer edge show the amperes the wire will safely carry before raising its temperature thirty degrees. On the back of the gauge is given the ohms resistance of a foot of copper wire of any size, as shown by the gauge. This resistance is multiplied by seven to find that of a foot of iron wire, or by thirteen to find the resistance of a foot of German silver wire. This very useful implement is manufactured and sold by the Novelty Electric Company, whose factory and warerooms are at 50, 52, and 54 North Fourth Street, Philadelphia, Pa. For price see advertisement on page 349, this issue.

FRONT. BACK.

THE "NOVELTY" ELECTRIC WIRE GAUGE.

Long Distance Fast Trains.

The fastest train from Denver to Chicago is now the 9 A. M. on the Burlington, reaching Chicago at 2:15 P. M. the next day. It is also the fastest long run in the West. The distance is 1,028 miles, and the time, allowing for the difference in longitude, is 28¼ hours. Hence the speed from terminal to terminal is 36·4 miles an hour. This is not far behind the speed of the limited trains between New York and Chicago, and is a pretty fast schedule for a run of over 1,000 miles. The fastest New York-Chicago trains are as follows:

New York to Chicago—North Shore Limited via New York Central and Michigan Central, 976 miles in 25 hours. Average speed between terminals, 39 miles an hour.

Buffalo to Chicago—North Shore Limited via Michigan Central, 536½ miles in 14½ hours. Average speed between terminals, 37·8 miles an hour.

New York to Chicago—South Shore Limited via New York Central and Lake Shore & Michigan Southern, 964 miles in 24¾ hours. Average speed between terminals, 39 miles an hour.

New York to Chicago—Pennsylvania Limited via Pennsylvania Railroad, 911 miles in 24½ hours (allowing for the ferry). Average speed between terminals, 37·2 miles an hour.

New York to Chicago—Columbian Express via Pennsylvania Railroad, 912 miles in 26¼ hours. Average speed between terminals, 34·7 miles an hour.

The Southwestern Limited from New York to St. Louis by the New York Central, etc., runs 1,168 miles in 30¾ hours, or 38 miles an hour between terminals.

Very much the greater part of the Burlington line is single track, and on much of it the freight business is heavy. A schedule of 36·4 miles an hour for 1,028 miles therefore requires skillful operating besides robust motive power. This fast train is hauled by the class "H" mogul designed at Aurora.—*Railroad Gazette.*

Eating Before Sleeping.

It used to be considered prejudicial to good health to partake of food just before going to bed. But many physicians now recommend to their patients a light meal before retiring. On this subject Dr. W. T. Cathell, in *Md. Med. Jour.*, says:

Many persons, though not actually sick, keep below par in strength and general tone, and I am of the opinion that fasting during the long interval between supper and breakfast, and especially the complete emptiness of the stomach during sleep, adds greatly to the amount of emaciation, sleeplessness, and general weakness we so often meet.

Physiology teaches that in the body there is a perpetual disintegration of tissue, sleeping or waking; it is therefore logical to believe that the supply of nourishment should be somewhat continuous, especially in those who are below par, if we would counteract their emaciation and lowered degree of vitality; and as bodily exercise is suspended during sleep, with wear and tear correspondingly diminished, while digestion, assimilation, and nutritive activity continue as usual, the food furnished during this period adds more than is destroyed, and increased weight and improved general vigor is the result.

All beings except man are governed by natural instinct, and every being with a stomach, except man, eats before sleep; and even the human infant, guided by the same instinct, sucks frequently day and night, and if its stomach is empty for any prolonged period, it cries long and loud.

Digestion requires no interval of rest, and if the amount of food during the twenty-four hours is, in quantity and quality, not beyond the physiological limit, it makes no hurtful difference to the stomach how few or how short are the intervals between eating; but it does make a vast difference in the weak and emaciated one's welfare to have a modicum of food in the stomach during the time of sleep, that, instead of being consumed by bodily action, it may during the interval improve the lowered system. I am fully satisfied that were the weakly, the emaciated, and the sleepless to nightly take a light lunch or meal of simple, nutritious food before going to bed for a prolonged period, nine in ten of them would be thereby lifted into a better standard of health.

In my specialty (nose and throat) I encounter cases that, in addition to local and constitutional treatment, need an increase of nutritious food; and I find that by directing a bowl of bread and milk, or a mug of beer and a few biscuits, or a saucer of oatmeal and cream before going to bed, for a few months, a surprising increase in weight, strength, and general tone results. On the contrary, persons who are too stout or plethoric should follow an opposite course.

Steam Launches.

The steam launches or cutters for the United States naval vessels are built strong enough to be raised and lowered with bunkers and tanks full and steam up. They are 30 feet long, 7 feet 9 inches beam, 4 feet deep, 2 feet 5 inches and 2 feet 10 inches draught forward and aft. They have a speed of 7½ to 8 knots. They are fitted with compound vertical inverted engines, intended to run at 300 revolutions per minute with a boiler pressure of 160 pounds. The cylinders are 3½ inches by 5 inches and 7 inches by 5 inches. The valves are of the three-port slide valve type, with 1⅝ inches travel, and driven by the ordinary link motion. The crank shafts are of wrought steel, with two thrust rings forged on. The screws are true helices, 27 inches diameter and 48 inches pitch, or 36 inches pitch for 28 feet cutters; the helicoidal area is 3·19 square feet, and the projected area 2·23 square feet. The boilers are of the Towne pattern, having a rectangular grate, surrounded by a water box with water tubes running diagonally from side to side above the grate, with a top steam drum connected to the water box by tubes. These boilers have been in service for some years, and are found to steam freely with natural draught, to be economical in coal consumption, and to have a low center of gravity. Their working pressure is 160 pounds per square inch. The condenser consists of a copper pipe along the keel. The boats carry 35 gallons of water on each side of the engine space, and 300 pounds of coal on each side of the boiler, or 70 gallons—640 pounds—of water and 600 pounds of coal. The weight of machinery is 850 pounds; boiler, with water and attachments, 2,295 pounds; bunkers, tanks, etc., 570 pounds; total weight, fully equipped for service, 4,955 pounds.

THE rate of progression of a storm is often 50 miles an hour, and a series has been traced in a direct line from north to south, a distance of 400 miles. Mr. Marriott thinks that the average altitude of a thunderstorm does not extend beyond about 5,000 feet above the earth's surface.

Correspondence.

The Largest Load of Logs.

To the Editor of the Scientific American:

Anent "The Largest Load of Logs," etc., with figure in a recent number of the SCIENTIFIC AMERICAN, you may be interested to know that in the report of the Michigan Forestry Commission, 1888, pages 32, 33, Prof. Beal gives an account and illustration of the largest load of pine logs ever drawn by one team (two horses)—30,068 feet board measure.

W. A. BUCKHOUT.

State College, Center County, Pa., May 13, 1892.

The Joint Snake.

To the Editor of the Scientific American:

I send herewith, for your snake department, a portion of the tail of the common "joint snake" of this region, in process of transformation into the "hoop snake," that wonderful creation of the negro imagination, a serpent that, taking his tail in his mouth, rolls over like a hoop and drives the horn or spike into a tree, which immediately wilts and dies.

In every neighborhood of the South and Southwest some venerable old darkey can be found who has "seed it myself, cah!" and has told the story so often that he religiously believes it.

When a joint snake loses a portion of its tail by accident or otherwise, the stump in a few weeks becomes sharpened to a point and covered with a hard shell of a reddish or brown color, as in this specimen. In this case the injury must have been rather recent, as the spike is still soft and flexible.

I have in the course of years met with several just such specimens as this, but so sharp and hard that it might truly be designated a spike or horn.

G. O. HARDEMAN.

Gray's Summit, Mo., May 16, 1892.

Facts About Artesian Wells.

To the Editor of the Scientific American:

Permit me to correct the claims made in your paper of May 7, wherein it is stated that the "Samson" artesian well at Waco, Texas, is the largest well in the United States, and throws the hottest water. None of the claims made are supported by the facts. Wells at Columbus, St. Louis, and other points are deeper than the Waco wells; being over 2,000 feet deep. The Ponce de Leon well at Jacksonville, Florida, is larger, being 12 inches, and many other wells are 10 or 12 inches or more in size. The Florida well has a volume of from 7 to 10,000,000 gallons per day, so is four or five times as large in point of volume as the "Samson;" and several of the wells in Kern Co., California, are twice as large, while here in Dakota we have a number of wells two and three times as large. Again, as to being the hottest—having a temperature of 103°—the claimant has probably not heard of the hot water artesian wells at Boise City, Idaho, the temperature of which ranges from 160° to 170°—the water being used for heating purposes. Finally, as to the matter of pressure, the Dakota wells with pressures ranging from 50 to 220 pounds per inch stand, in this respect, at the head of the list, supplying the most perfect water powers to be found in the world. The "Samson" is indeed a giant and a marvel, but is overshadowed in all respects by many other wells in this country, as well as by others in France, Australia and other countries.

W. P. BUTLER.

Huron, Dakota, May 16, 1892.

Yankee Fish Catching.

To the Editor of the Scientific American:

The inventive genius of the New England backwoodsman is most noticeable in his methods of catching fish. Usually he is too poor to indulge in bamboo poles, plated reels, glittering spoons, and artificial flies. This circumstance, however, does not prevent him from securing his share of the denizens of the streams and ponds in the various seasons.

In April, snaring pickerel is the leading sport with these men. They cut a long birch pole, the weight of which would make the average city sportsman groan before he had carried it a mile, and at the end they fasten a piece of wire about eighteen inches long. To this wire they attach a noose made of carefully plaited hairs taken from the tail of a horse. Enough of these hairs are taken to render the noose stiff, so that it will pass through the water without closing.

With this tackle the fisherman seeks out the quiet shallows in the streams and ponds, and when he espies a pickerel he carefully drops the noose into the water at a point some distance to the rear of the fish, and gradually advances it toward him. When the noose has passed the middle of the fish's body a sudden jerk tightens the noose about him, and in a twinkling it is landed. These men are very dextrous at this style of fishing and seldom miss landing the game; but in the hands of a novice the noose is absolutely useless.

After the spring freshets are passed and the streams have resumed their usual size, bobbing for eels begins. This is a sport that any man who is fond of piscatorial diversion will enjoy. It is carried on in the night, and if the fisherman wishes to be successful, he must choose a dark night, for reasons that will appear later on.

In bobbing for eels no hook or seine or net is used. The tackle consists of a line, a broom corn, and a few angle worms. The broom corn must be a strong one. One end of it is sharpened. Through the other end a hole is made, into which is threaded the line. The broom corn now acts as a needle. It is thrust lengthwise through the worms, which are pushed back upon the line until they cover four or five feet of it. The broom corn is then removed, and that portion of the line covered with worms is gathered up and tied in a half a dozen bunches or double loops. When the fishing ground is reached, these bobs as they are called are dropped into the water. When the fisherman feels a bite he hauls the line rapidly in and throws the eel into the boat, where it loosens its hold on the worms and the bob is dropped into the water again. The eel will not loosen its hold on the worms until its body comes in contact with a hard substance or unless it catches sight of the boat. It is useless to fish with bobs on a moonlight night, for the moment that the eel comes to the surface and sees the boat it lets go the bait. I have known two experienced men with bobs to catch 200 pounds of eels in this manner in three hours time.

Early in the spring, when the water is cold and brook suckers have a market value, large numbers of them are caught in gunny sacks. The fisherman fastens to a barrel hoop the mouth of a gunny sack. He seeks out a narrow spot in the stream and in the middle of it he sets the hoop, building a wall of loose stones on each side of it to the banks. He then goes up the stream a quarter of a mile and wades down toward the bag, all the time prodding the bottom with a pole. This drives the fish down the stream, and when they reach the dam they follow it along until they find the opening into the sack. They rush into it, and when the fisherman arrives he lifts up the hoop, and dragging the sack on to the bank empties his catch on the ground. Wagon loads of suckers are often caught in a single night in this manner.

THOMAS HOLMES.

The Ives Colored Pictures.

Mr. Frederick E. Ives thus describes his process for obtaining and projecting pictures in the colors of nature by aid of photography:

"By means of a very ingenious compound camera front, three photographic negatives of the object are made by simultaneous and equal exposure, from the same point of view, and upon the same sensitive plate. The photographic plate is sensitive to all colors of light, but by introducing light filters one of the negatives is made by such light rays only as excite the fundamental red sensation, and in due proportion; another by such light rays as excite the fundamental green sensation, and another by such light rays as excite the fundamental blue-violet sensation.

"From this triple negative a triple lantern slide is made, which, although it shows no color, contains such a graphic record of the natural colors that in order to reproduce them to the eye it is sufficient to superpose the three images, one with red light, one with green, and one with blue-violet. This is accomplished either in Mr. Ives' new heliochromoscope, a device about the size of a hand stereoscope, and used in much the same way, or by projection with a special optical lantern, having three optical systems, with red, green, and blue glasses.

"The process is as scientifically accurate for reproduction in color as ordinary photography is for reproductions in monochrome, but at present can be carried out successfully only by a scientific expert employing the photospectrograph for testing the sensitive plates and adjusting the selective color screens. When such preliminary adjustments have been correctly made, the process is almost as simple and reliable as the ordinary negative process. By a modification of the process, introducing further complication, color prints are made on glass or paper; but the comparative simplicity of the plan of superposing images commends it to scientists, and is more convincing to the general public."

Sensitive Water Jets.

Prof. W. B. Croft, in a note to *Nature*, says: A form of this effect lately presented itself which seemed in some ways new. A thin jet, 5 feet high and arched so as to be 3 feet at the base, was falling in a feathery spray. At 13 feet distance a small Wimshurst machine was set going; not instantly, but after two minutes, the spray gathered itself up almost into one clear line; although the jet was turned up and down and the machine was discharged, the falling water would not resolve itself again into spray for fifteen or twenty minutes. It is difficult to imagine the medium for this action; it is too indefinite, perhaps, to suppose that an indicator is found for the trembling of a disturbed ether while it is dying down.

The well known experiment is not known enough, for it is not often described in books. Take a glass rod, electrified ever so little, to a certain point; at once the jet collects itself; a slight move away brings back the old disorder, while an inch nearer makes things much worse. It is a striking illustration to help one to imagine what the electrical forces of the air may do. We can perhaps understand those thick thundery rain drops, that almost allow us to pass between them while they are giving friendly warning of what will come.

Preservation of Mineralogical and Geological Specimens.

Minerals and fossils are exposed to two causes of destruction—deliquescence and efflorescence. Deliquescence is the property that certain bodies possess of absorbing moisture from the atmosphere and of gradually dissolving in the water that results therefrom. There is no other means of preventing such accidents than to preserve the specimens in hermetically sealed jars.

Efflorescence is the property found in other bodies of resolving themselves into dust. There are several processes for preserving specimens from such destruction. Certain fossils converted into white pyrites, or whose substance is impregnated with salts and cannot be washed, should be thoroughly dried and coated with a varnish that does not scale off, or else be immersed in oil. Impressions that have a tendency to disappear may be preserved by impregnating them with a thin solution of gum arabic to which a little sugar has been added in order to prevent it from cracking in drying.

Mr. Chalande recommends the following process for the preservation of rocks, fossils, bones, etc., that are apt to crack or effloresce: Immerse them for from one hour to twenty-four hours, according to the size of the specimens and their brittleness, in a mixture of equal parts of silicate of soda and water or of potassa and water. After being dried the specimen will in a short time acquire considerable hardness.

Mr. André Fouville gives the following process for preserving pyritous fossils: "Pyritous fossils are of all paleontological specimens the most difficult to preserve. Contact with moist air alters them, and converts the sulphuret into sulphate to such a point that they become unrecognizable. The surest and most advantageous means is to preserve the fossil in paraffine, a solid substance melting at 44° and containing no oxygen. But only specimens of small size can be preserved in this manner. Ferns, trunks of sigillarius and bulky fossils should be coated with a solution of silicate of soda in boiling water."

For consolidating fossil bones, Mr. Lambert gives the following process: Melt some spermaceti over an alcohol lamp and while it is still hot coat the bone with it. The spermaceti will enter the bone through the pores, and, on cooling, will consolidate it and give it the hardness of stone. If, as sometimes happens, a thin layer of the fatty substance remains upon the surface, it may be made to disappear by submitting the bone to the heat of a piece of burning paper. Some persons employ gelatine or glue. This method may be good, but it is not as effective as the one above given.—*La Nature.*

Treatment of Rheumatism.

It seems as if everybody is complaining of rheumatism nowadays, young and old, rich and poor. Science, ever ready with something new to alleviate the sufferings of mankind, has not failed in this direction, and salol is now the remedy extensively used for rheumatism. The *Medical Times and Register* says: "Therapeutically the anodyne property of salol is exhibited in the cases that are rheumatic in source." The first triumphs of salol were won in the treatment of acute rheumatism, excelling, as it apparently does, all other remedies in its power to abate and lessen fever.

If all the conditions be propitious, by the end of the second and third day fever and joint pain and swelling will have disappeared. Salol has a further use, in that it is antiseptic, and excellent results have been obtained from it when used as a disinfectant for the bowels in cases of cholera, typhoid fever, etc. In connection with the cure of rheumatism, it may be stated that of late years massage treatment has found great favor with rheumatic patients. In practicing massage, the fingers are usually moistened with some sort of oily preparation, and for this purpose nothing better can be used than lanoline. Many physicians consider this vastly preferable to vaseline, or any other preparation, and its use has invariably been attended with the greatest success.

Bare Underground Conductors.

It is pointed out in *L'Electricien* that not only does serious deterioration go on when the bare wires are in the presence of moisture, owing to the formation of hydrocarbonate of copper, a formation which is accelerated when the wires become reduced in section and consequently heat to a greater extent, but it has apparently been proved that an explosion which took place in Paris was due to the generation of gas from the electric decomposition of moisture, which gas was fired by the presence of sodium, also due to a decomposition taking place, and not to any electric spark. Thorough ventilation would seem to be the best remedy against such accidents.

Curious Things About Clocks in India.

Clocks are regarded as curiosities by the Hindoos, and for this reason half a dozen or more timepieces are often found in the apartments of the wealthy Hindostanees. They are not used as timepieces, but simply for ornament, since the old-fashioned way of telling the hour of the day in India, by calculating the number of bamboo lengths the sun has traveled above the horizon, is entirely satisfactory to the natives. It is said that in the country police stations in India, where the European division of the hours is observed, time is measured by placing in a tub of water a copper pot in which a small hole has been bored. It is supposed that it will take one hour for the water to leak into the pot so as to fill it and sink it. When the policeman sees that the pot has disappeared, he strikes the hour on a bell-like gong. If he is smoking or dozing, the copper pot may have disappeared several minutes before he discovers the fact; but the hour is when he strikes the gong.

Intoxicating Rye.

In some of the communes of the department of Dordogne, France, the rye of the last harvest exhibited some singular toxic properties. In several villages, persons who had eaten bread made from this rye were attacked with a general torpor and found it impossible to do any work for twenty-four hours. The effects produced did not resemble those caused by ergot, but rather those of darnel, with an intenser and quicker action.

According to the *Revue Internationale des Falsifications*, the same phenomena have been observed in Russia. Mr. Woronine, who has examined specimens of the rye said to have stupefying and intoxicating properties, finds that the grains have been overrun by a cryptogamic vegetation, and mentions several forms of fungi that may be suspected of having caused the accidents.

Mr. Prillieux has made a similar examination of the rye harvested in Dordogne, and has found that the small, light grains of mediocre appearance exhibit on their surface no trace of the presence of the fungi observed by Mr. Woronine. It is in the interior of the grains that he has detected, by means of the microscope, the presence of a fungus, always the same, whose mycelium has overrun the external layer of albumen. He has distinguished numerous interlaced filaments forming a sort of stroma surrounding the albumen and even penetrating the teguments of the grain. He has found that at certain points the starch grains present a very evident corrosion, due doubtless to the action of a diastase secreted by the fungus.

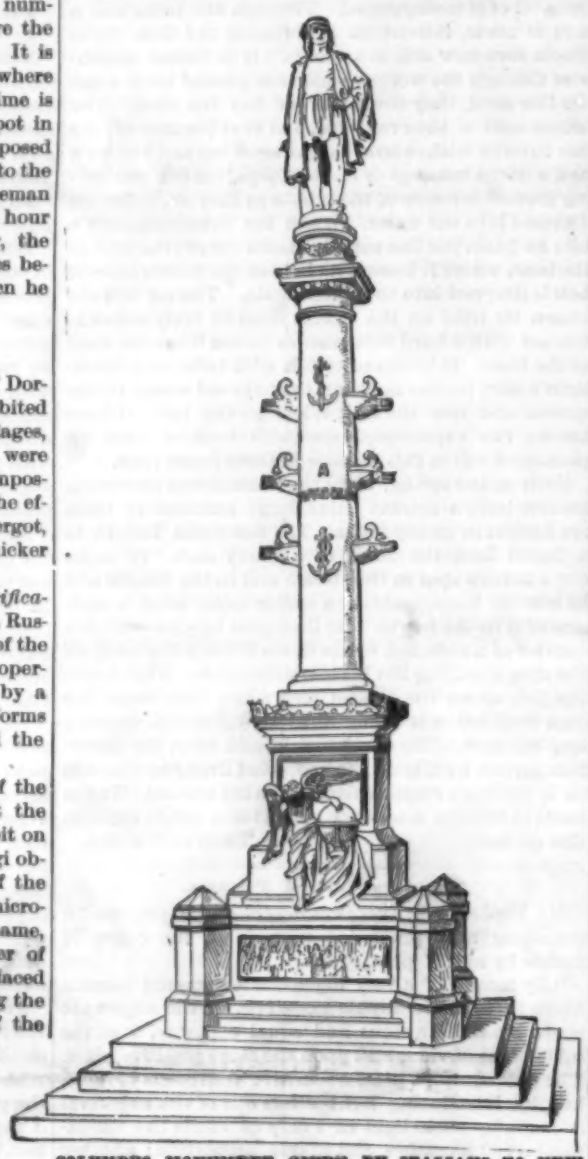
The organization of the filaments permits of the supposition that the fungus belongs to the genus *Dendodrochium;* but the arrangement of the spores more closely resembles that observed in *Sporochisma paradoxum*. As there exists no resemblance with any known genus, Mr. Prillieux thinks that a new genus will probably have to be created for this fungus.—*Revue Scientifique.*

The Fastest Long Distance Train in the World.

The Empire State Express Line on the New York Central and Hudson River Railroad has now been running since November 1, 1891, and has been operated with the greatest regularity. It leaves New York daily at 9 A. M., and goes through to Buffalo, 439 4/10 miles, in 8¾ hours, being at the rate of 50 7/10 miles an hour, including stops. The train consists of an engine and four cars, weighing about 200 tons. Weight of the engine 90 tons and driving wheels 40 tons. This is probably the fastest railway train in the world, distance considered.

COLUMBUS MONUMENT FOR NEW YORK.

Probably there will be no more beautiful and completely representative monument erected to the great discoverer on the four hundredth anniversary of his landing in the new world than the splendid gift of the Italians of New York to that city, a representation of



COLUMBUS MONUMENT GIVEN BY ITALIANS TO NEW YORK.

which is here given, and which is to be unveiled with imposing ceremonies on the 12th of October next. The monument will have a place at the Eighth Avenue and Fifty-ninth Street entrance to the Central Park. Sufficient contributions for the purpose were obtained without difficulty when the idea first took shape among the Italian residents here, and, through Signor Barsotti, of the *Progresso Italo-Americano*, an Italian newspaper of New York, the order for a design for the monument was, in January, 1889, forwarded to the Minister of Public Instruction of the Kingdom of Italy. The latter called for a competition of designs for the monument, in which none but artists of Italian nationality might compete. Nine judges were appointed—three architects, three painters, and three sculptors, all eminent in their respective departments—and the competition was large and spirited. The award was made to Signor Gaetano Russo, born in Messina, Sicily, and examples of whose work are now to be found in many of the public buildings of Rome and other Italian cities.

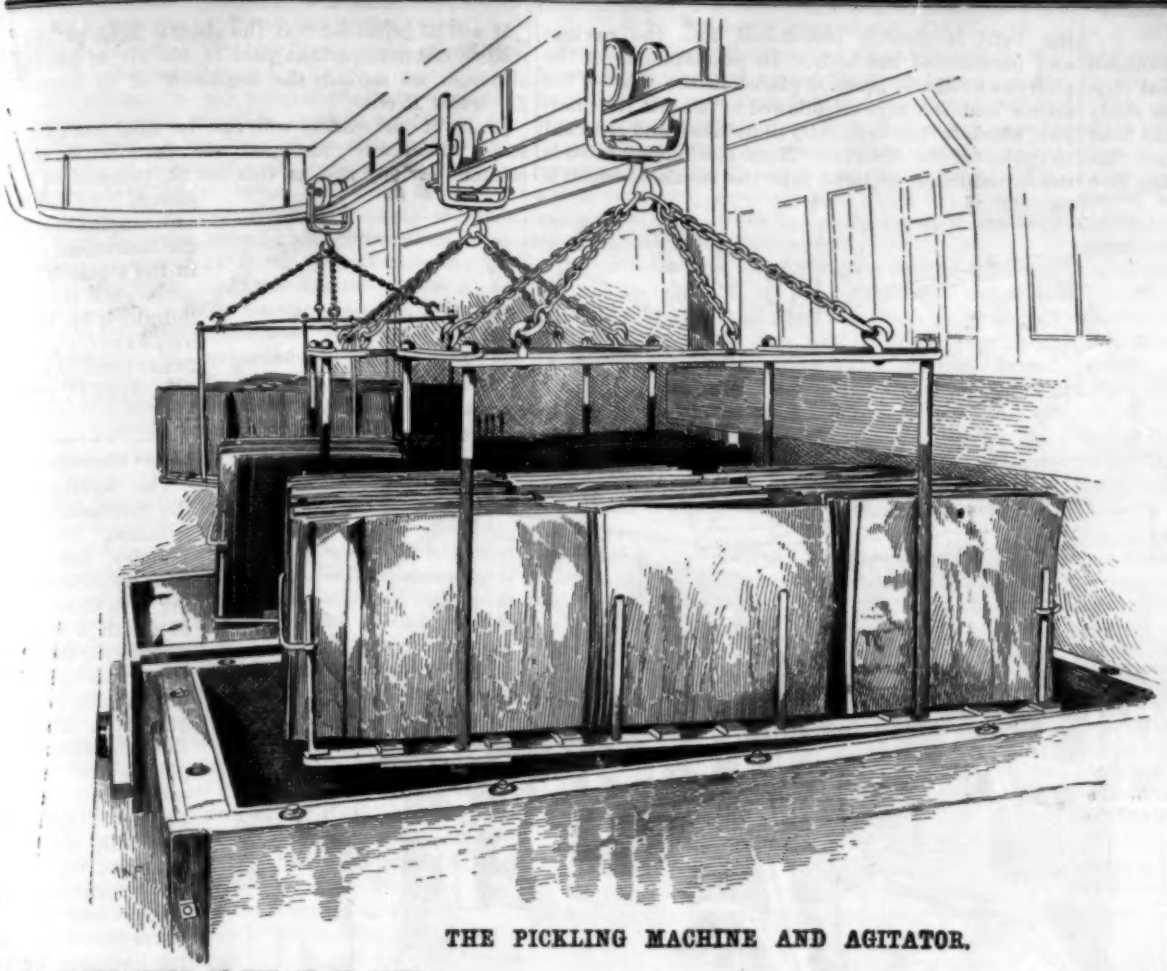
The entire monument, with its terraced pedestal, will be 77 feet high. The figure of Columbus is 12 feet 9 inches high, its feet being 36 inches long, and it is cut from a block of Carrara marble which weighed twenty-five tons. The column and pedestal are of red granite, a short terrace of Carrara marble separating them, the capital of the column being also of marble. The red granite terraced pedestal has octagonal corner columns, a noble figure of Genius crowning the second terrace on one side, and on the other side, at the back of the Genius, is depicted a magnificent Alpine eagle, both in marble. Below the figures, on each side, are splendid basso-relievos, ten feet by two feet in size, these being in bronze, as are also the six prows, three on each side of the column, facsimiles of those of the vessels of Columbus, with representations of anchors above and below the central inscription, "A Cristofero Colombo." The Genius is 10 feet 4 inches high, and cut from a block of marble originally weighing twenty tons, it represents a youth upheld by the wings of Faith, and holding in its grasp the whole globe, which it is apparently studying with an intentness which may well be likened to that with which Columbus pored over the maps in existence at his time. The Eagle, on the reverse side of the monument, and of similar size, is in the attitude of guarding the arms of the United States and those which were distinctive of the Republic of Genoa during many centuries.

The illustration given of one of the basso-relievos represents Columbus starting in a little boat from his vessel to first set foot upon the land of the New World. The vessels, boats, banners, and costumes are designed to be accurate representations of the originals, and the artist has endeavored to faithfully portray the interest and excitement undoubtedly felt by all on board the little fleet. The basso-relievo on the opposite side shows Columbus reverently returning thanks upon the land, his companions pressing all around and kneeling about him, and the frightened Indians peeping through the foliage. The spaces between the basso-relievos and at the sides of the Genius and the Eagle will be filled with bronze tablets bearing English inscriptions by Ugo Fleres, an Italian poet.

Exhibition Notes.

In front of the Administration Building at the Exposition the largest fountain in the world will toss graceful streams and excite the admiration of millions of spectators. It is now being constructed in Paris by Sculptor MacMonnies, who is acknowledged to be one of the very best of living artists. The idea of the fountain is that of an apotheosis of modern liberty—Columbia—and will take the shape of a triumphal barge, guided by time, heralded by fame, and rowed by eight standing figures, representing on one side the arts and on the other science, industry, agriculture and commerce. The barge is preceded by eight sea horses, forming a semicircle in front and mounted by eight young men as outriders, who represent modern commerce. The smallest figure is some twelve feet in height and the largest twenty feet. The design of the base is circular—150 feet in diameter—and is flanked on each side by columns 50 feet high, surmounted by eagles. The water is furnished by a great half circle of dolphins in the rear and by a system of jets which entirely surround the barge and figures. At night the fountain will be illuminated by electricity after the principle employed in fountains in the Champ de Mars. Moulders and other artisans are working day and night in getting this immense fountain ready in time.

COLUMBUS MONUMENT—BASS-RELIEF—FIRST BOAT LEAVING THE SHIP.

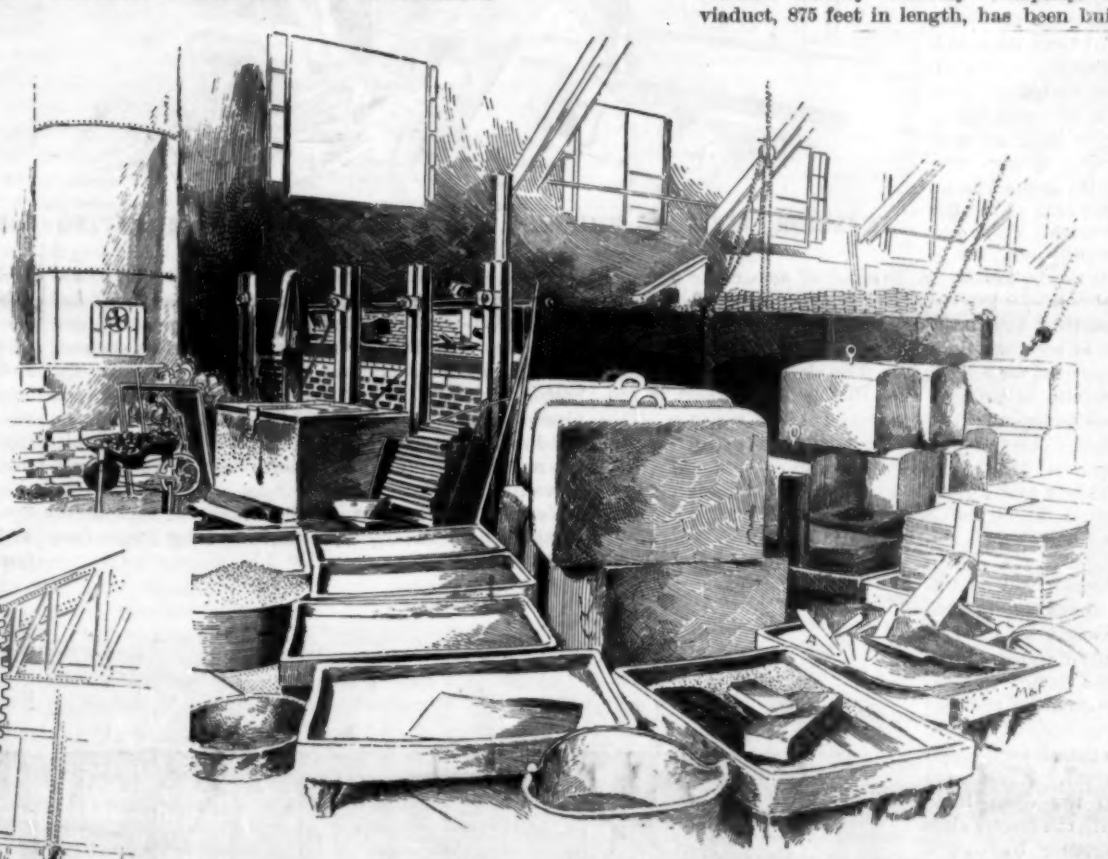


THE PICKLING MACHINE AND AGITATOR.

THE MANUFACTURE OF TIN AT ST. LOUIS.

(*Continued from first page.*)

plate. The location for a steel plant at Granite City, as well as for other manufactures, is unsurpassed. Coal will cost about one-third the price in Wales. The leading railroad systems of the country connect at this point, and labor is plentiful and of a high grade. The total production of this concern is but a drop in the bucket compared with the aggregate consumption of the article. To indicate to what proportions the manufacture of tin plate can develop, it is only necessary to add that it will require fifty establishments similar to the one we have just described to supply the demand in this country.



THE ANNEALING OVENS FOR TIN PLATES.

Speed of Elevators.

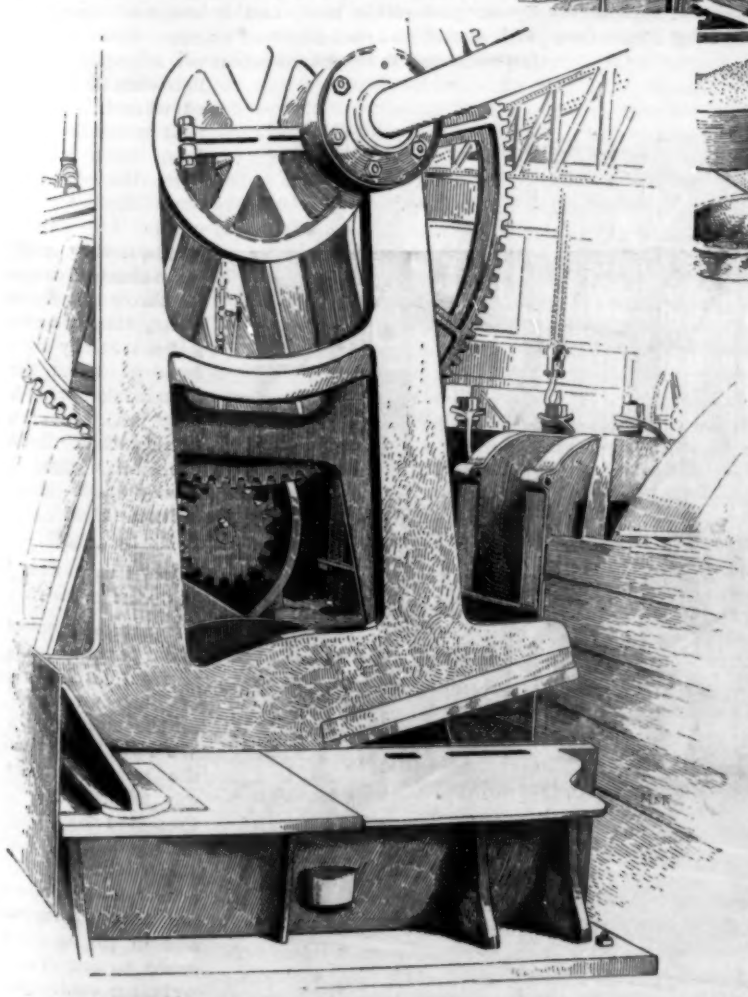
The maximum speed of the fastest passenger elevators which have ever been built, the New York *Journal of Commerce* says, is 1,500 feet a minute, a rate of one mile in three minutes and a fraction. Before the fire in the Western Union building in New York City occurred that company had a machine which could run 1,500 feet a minute. It was the only one of its kind in the East.

These machines are of the water balance type—that of the orignal hydraulic elevator, the invention of Cyrus Baldwin. Owing to its expensiveness, and the fact that it could not be controlled automatically, it went out of use. The speed was regulated by the engineer, and it went fast or slow as he pleased.

With the modern elevator almost any speed desired can be obtained; it all depends on the power used and the distance traveled. In a building which has a shaft of 250 feet, a speed of from 850 to 1,000 feet a minute can be attained. On a rise of 150 feet it is easy to get a speed of 750 feet per minute with a weight of 1,000 pounds aboard the elevator. In New York the fastest elevators are in the Union Trust Company's building on Broadway, near Wall Street. They shoot up or down, carrying 3,000 pounds, at a speed of 600 feet a minute. When tested with lighter weights, they have traveled from 800 to 900 feet in a minute. But the average speed of elevators in office buildings in and around New York is 300 feet a minute.

The largest elevator cars in the world are now at Weehawken. These elevators, of which there are three, are designed to carry 135 persons on each trip, and are equivalent to ten tons. They are owned by the North Hudson County Railway Company. A viaduct, 875 feet in length, has been built out from the Palisades to a point above the ferry depot. From the rails on the viaduct to the river level the distance is about 150 feet. The railroad company's contract calls for a speed of 200 feet a minute. The common elevators of small business buildings are worth at least $3,000. From that they range up to $13,000 in the same class of buildings.

From an elevator point of view, the new Masonic Temple building in Chicago will be the most important in the world. It will have 24 cars built in a circular shaft having a 250 foot rise. There will be express elevators, way and freight trains. The first will go to the top floor without stopping, while the others will stop either at every floor, or at the 5th, 10th, 15th, and so on. They will not run at full speed, probably, because passengers do not like the sensation of flying. With the present safety devices it is just as safe to run fast as slow.



THE DOUBLING AND SHEARING MACHINE.

Zinc Chloride for Preserving Wood.

A new method of impregnating logs with zinc chloride, in order to preserve them, is now in use in Austria, being known as the Pfister process. The timber is impregnated in the forest as soon as possible after it is felled. The zinc chloride solution has a specific gravity of 1·01 and is forced into the thick end of the log by a force pump. To this end, an iron disk of suitable diameter and furnished with a cutting rim is forced into the end of the log and secured by clamps. The time required for this preliminary work is only three or four minutes for each log. After a pressure of two or three atmospheres has been maintained at the thick end of the log for a few minutes, the sap begins to exude at the opposite end, and finally a weak solution of zinc chloride comes through, showing that the operation has been completed. About 2¼ gallons of the solution are required per cubic foot of timber treated. Though rapid, the process does not appear to distribute the solution so uniformly as other methods.

Electric Light in Medicine.

There recently died at Vienna the mechanician Josef Leiter, a man who, in concert with eminent physicians, spent many years of his life in zealous study and experiment in order to realize one of the most modern and remarkable ideas of medical science. He was engaged with the solution of the question how far the interior of the human body can be made accessible to the eye of the physician. Before his death he had the satisfaction of knowing that his merits were fully acknowledged in a recent work by the distinguished neurologist Prof. Lewandowski.

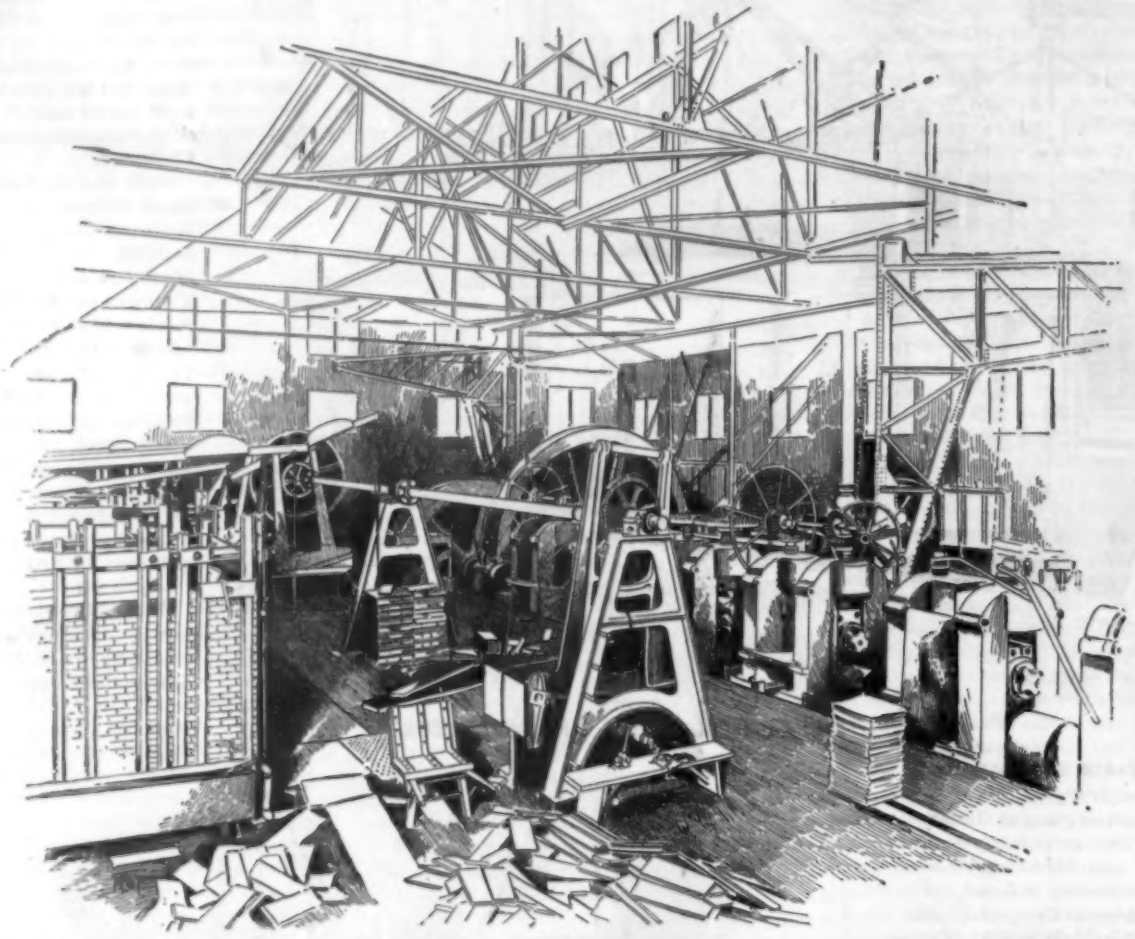
The medical world is already able to illuminate the interior of the mouth, the pharynx, the stomach, eye and ear, with the electric light. This is effected either by the direct introduction of the source of light into the organs concerned or by the reflection of the light. At first the light of incandesced platinum wire was used, but latterly the well-known carbon filaments of the glow light have been universally employed. The "mignon" glow lamps, scarcely larger than an ordinary pea, were first shown at the Vienna Electrical Exhibition, and were successfully adapted to this use by Leiter. A number of apparatus for both methods of introducing the electric light (direct and by reflection) have been devised. The instruments for the use of reflected light do not differ in principle from those used for solar light. The electric light has, however, the advantage that the medical expert is rendered independent of the freaks of the weather. This principle can of course be combined in all possible manners with concentrating lenses, reflectors, etc. The first such apparatus of this kind emanated from Vienna, where they were executed in 1883 by the optician Jirasko, at the instigation of Prof. Mosetti von Moorhof. In the direct introduction of light we distinguish two modifications, illumination properly so called and diaphonoscopy. This latter method depends on the fact that human flesh is, in thin layers, translucent. If we hold up the open hand with the fingers close together before a brilliant light (not otherwise visible to the observer), the fingers appear at their margins translucent, and transmit a reddish light. This method is used in dentistry. The patient bites a small gag of vulcanite, the lateral process of which, projecting into the mouth, supports a mignon lamp. The interior of the mouth is brilliantly illuminated, and the dentist can look into the inside of the tooth and detect any morbid changes in the enamel, the dentine, the roots, the gums, etc.

The most interesting method at present is that by which the light is directly introduced into the cavities and passages of the body. In examinations of the pharynx a mignon lamp is placed in the shaft of the mirror and the rays are allowed to fall into the pharynx, which is thus brilliantly illuminated and reflected to the eye of the observer. Much more complicated is the introduction of light into the stomach, which is first evacuated by means of the stomach pump and afterward expanded with air after the apparatus has been introduced. This apparatus is a long tube which has at its closed lower end a glass window, behind which is placed a mignon lamp connected with the battery by wires. When the current is turned on the filament becomes ignited, and illuminates through the window the interior of the body, while a small mirror makes the illuminated parts visible to the observer.

Very favorable reports on the results of such investigations have already been furnished by Profs. Oser and Mikulicz.

It will be perceived that the electric light plays already a not unimportant part in the art of healing, although we see only the beginning of its career.—*Electrical Review.*

[Many of our readers will call to mind the gastroscope, which was illustrated and described in these columns as long ago as October 29, 1881, and of the picture illustrating the application of the instrument within the stomach of a person, and the bulb lighting it up, which appeared in the SCIENTIFIC AMERICAN, April 14, 1883.—ED.]



INTERIOR VIEW OF THE TIN PLATE MILL, ST. LOUIS STAMPING COMPANY.—(See first page.)

THE PICKLING TUBS FOR TIN PLATES.—(See first page.)

Insect Illumination.

The secretary of the Smithsonian Institution, Professor Langley, has been recently experimenting with Cuban fireflies with a view to discovering the manner in which the illumination they emit is generated. He says that the light they give is the "cheapest" in the world—produced, that is to say, with the least heat and the smallest expenditure of energy—and he believes that a successful imitation of it would prove a most profitable substitute for gas or electricity. The insects are beetles two inches long, and belong to the family of "snapping bugs," so called because when one of them is laid on its back it snaps itself into the air with a clicking sound. The secret of the light this firefly gives is as yet undiscovered. Apparently it is connected in some way with the mysterious phenomena of life, and chemists and physicists have sought in vain to explain its origin. On each side of the animal's thorax is a luminous membraneous spot, and these flash at intervals, so that the Cubans put a dozen of the insects in a cage together and so obtain a continuous illumination bright enough to read by. This light is accompanied by no perceptible heat, and is seemingly produced with almost no expenditure of energy. How great an improvement it represents upon all known artificial lights can be imagined when it is stated that in candle light, lamp light, or gas light, the waste is more than 99 per cent. In other words, if they could be so obtained as not to throw anything away, they would give nearly one hundred times the illumination which they afford at the present time. Even the electric light is mostly waste.—*American Analyst.*

Credit to Whom Credit is Due.

In a recent number of our paper we quoted from *La Nature*, of Paris, an article on the electric girl. We now learn that the quoted article was translated into French from our American neighbor *Electricity*. We take pleasure in making this statement and in giving due credit to our enterprising contemporary.

New Process of Purifying Cane Juice.

William Valentine Fry, of Lambayeque, Peru, describes his process as follows:

I place a quantity—say for example thirty pounds—of the leaves, twigs, or points of small boughs of the eucalyptus tree in a kettle or boiler with a proportionate quantity of cold water, the quantity of water for thirty pounds of leaves, twigs, etc., being 55 gallons, more or less. The contents of the kettle are then boiled for three hours, more or less, or until the decoction has a density of 15° Cartier standard when the liquid is hot. When cold, the density of the decoction will be from 9° to 10° Cartier standard. The decoction will lose from eight to ten gallons during the process of boiling, the evaporation of course depending to a certain extent on the intensity of the fire. The decoction is then properly strained to separate it from the leaves and twigs, and is ready for use in the process of purification.

I use the decoction in the proportion of from one and one-half to two gallons of the decoction to 500 gallons of cane juice, as follows: I place in the defecator from twenty to forty gallons of cane juice, to which I add the eucalyptus decoction in about the proportion specified, taking care that the contents of the defecator be well stirred. Heat is then applied in the usual or any preferred manner until an active ebullition takes place. Before the ebullition takes place the impurities will have risen to the top of the liquid in the defecator. As soon as the ebullition takes place the steam or heat is cut off from the defecator, and a short time—say from ten to twelve minutes—is allowed for settling. The juice can then be passed to the evaporator or vacuum pans for the making of the sugar, and the impurities can then be removed in the usual manner employed in cooking houses. If white sugar is required, charcoal filters should be used. To make the ordinary grained sugar of commerce, no charcoal filters are required, but bag filters can be used to advantage.

American Ramie.

The first experiment in the manufacture of cloth from ramie in the United States was made lately at the San Jose woolen mill. The fiber was put through the same presses at the mills as any other material used for making cloth. It went through the machines, was twisted into thread, and then a thread of wool and a thread of ramie were twisted together. Being put on the loom the machine was started, and in a few minutes the cloth began slowly to unroll.

The fabric resultant from the process was a strong, closely woven piece of cloth. Holding it up to the light, one could not see through it. The color of the cloth was a bluish-gray, the wool supplying the dark and the ramie fiber the light portion. Ramie is much stronger than wool, is forty-one times stronger than cotton, and more nearly approaches silk in this respect than any other material used in the manufacture of cloth. Thus it is evident that a fabric made of a mixture of wool and ramie is far superior to a cotton and wool mixture. The fiber, when ready for the mills, is in bunches about five feet long, of a creamy white color, and has a luster like silk. It can be dyed any color and still retain its luster, and hence can be used in the manufacture of silk-mixed weaves, making a fabric just as good in every way, but far cheaper than if silk were used.

It will have the effect when it comes into general use of cheapening all textiles of this character, while giving a fabric better in looks and wearing qualities. One of the big points claimed for ramie is the ease with which it can be produced, and the consequent big profit to the producer. Ramie is nothing more or less than a weed, and grows and increases with the prolificness for which weeds are noted. The plant does not need a rich soil; in fact, seems to thrive best in a soil in which nothing else will grow, and is especially valuable on this account. It is claimed that three crops a year can be secured, and that at the least calculation a profit of $300 an acre will pour into the pockets of the ramie cultivator. The field will not have to be replanted for twenty years, for the plants will grow and produce good fiber for that length of time.—*Pacific Lumberman.*

The Utilization of Tin Clippings.

The owners of a sardine factory have found a way to get rid of the piles of tin clippings which have encumbered their docks. These clippings are now carefully collected; those made by the dies which stamp the bottoms and covers of the cans are pounded into suitable shape for handling, while the strips made by the shears in cutting the tin for the sides are carefully bundled and boxed. The clippings find their way to the smelting furnace, where the tin with which they are coated is melted and drawn off separately, while the molten mass of steel which composed the plate is run into moulds and formed into window weights and other useful articles. The bright tin strips of various widths and lengths are made to serve manifold purposes, being made into tin tags which ornament plug tobacco, button moulds, ornamental baskets, and hundreds of other articles.

World's Fair Notes.

The agricultural building, an imposing and beautiful structure, situated across the main lagoon, southward from the great manufactures building, is rapidly approaching completion, and will be finished, even to all details of ornamentation, before October 1. It measures 500 by 800 ft. and has an annex 300 by 550 ft. and a connected assembly hall, which has a seating capacity of 1,500. Close by, on the south, is the dairy building, measuring 100 by 200 ft.

The northern portion of the main floor of the building will be occupied by the agricultural and other food exhibits of foreign nations, which, it is already assured, will be extensive. Great Britain, Germany, France, Mexico, Austria, Denmark, Sweden, Japan, Paraguay, Canada, and a number of other countries have already been assigned space, ranging from 1,000 to 15,000 sq. ft. each. It is expected that the agricultural exhibits by these countries will be as comprehensive as those of our own country, and will show some features which will be exceedingly instructive to Americans.

Occupying nearly all of the remainder of the main floor will be the exhibit of cereals and other farm products from the States of the Union. Every State and Territory, it is expected, will be represented by its products. Thus, upon this one vast floor, covering nearly ten acres, will be displayed in all their variety and perfection the pick of the farm products of the world. It is believed that the exhibit made by this country, naturally exceeding that of any other in extent, will attract great attention, also, by reason of its exceptional merit and the comprehensive information that will accompany it.

On the six acres of flooring in the annex, which is virtually an extension of that of the main building, will be shown every description of agricultural machinery, including not only the best and most improved now in use, but also such as will illustrate the progress of the industry from primitive times to the present.

In the great galleries of the building, which are most novel in construction and perfect in point of availability, will be located on the north front the wool exhibit; on the west end the apiary display, which will include working colonies of bees; on the south front the dairy implements, and on the great central sections the exhibit of the brewing and tobacco industries, and the wealth of magnificent exhibits of flours, meals, bread, pastry, sugars, confectionery, canned foods, oils, soaps, chocolates, etc.

One of the most novel, instructive and elaborate exhibits, and one that will undoubtedly attract the attention of every scientific person and scholar interested in any phase of agricultural life, will be that made by the Association of American Agricultural Colleges and Experiment Stations. This exhibit will occupy nearly 8,000 square feet of space, and will be located in the southwest corner of the building, on the first floor. It will represent the entire work of a model agricultural experiment station, covering entirely the field of experiment and research in crops, botany, horticulture, entomology, feeding stuffs, animal nutrition, dairy solids, milk testing and veterinary science, and will include an elaborate and complete botanical, biological and chemical laboratory.

In addition to this, the agricultural colleges of the United States will have, in this space, a combined exhibit graphically illustrating the work and special field covered by each college. This entire exhibit is not only unique but is something that has never been accomplished or attempted at any previous exposition. The exhibit will be put up and conducted by the directors of the different experiment stations and representatives of the different agricultural colleges of the United States, each contributing some part of the exhibit, the whole to be installed in a magnificent manner, at the expense of the United States government. This will give to every visitor an opportunity to witness the methods by which the great advances in all phases of agricultural life and research are carried on in the colleges and experiment stations of the United States.

Outside the building will be shown several magnificent exhibits, put up at a great cost, of the irrigation systems of the great West. On the lagoon just south of the annex to the agricultural building will be installed traction and portable engines and a wonderfully interesting exhibit of windmill machinery.

Helena, Montana, will send to the Exposition a meteor, discovered near that city. It is composed of nickel and magnetic iron, and is in two pieces of ninety and seventy pounds respectively. It is reported that when found these pieces were in a hole in the ground large enough to contain a house, from which fact it is inferred that the meteor exploded when it struck the earth.

From Holland an offer has been made to the Holland Society, of New York, and the St. Nicholas Society, of Brooklyn, to construct and present them an exact reproduction of the Half Moon, the ship in which Henry Hudson discovered and explored the river which bears his name. The societies named have accepted the offer and are planning to fit up the ship as a club house and to take it to Chicago, both to be exhibited and to be occupied by their members during the Exposition.

The prospect is that the Engineering Congress, which is to be held in Chicago in 1893, under the auspices of the World's Congress Auxiliary, will be a gathering of very great scientific importance. Of the $15,000 estimated to be necessary for its expenses, $10,000 have been raised. Many of the most prominent engineers of the world have accepted memberships on the advisory council, among whom may be mentioned William H. Maw and James Dredge, of the London *Engineering;* Don Fernandez Leal, president of the Mexican Society of Engineers and Architects; Sir C. S. Gowzki, of Canada, and others.

Chairman Corthell, of the general committee, who went to Europe last fall in the interest of the congress, invited thirty-six engineering societies to participate by sending delegates. About twenty-seven of these societies have accepted, and not a single declination has been received. He received on all sides expressions of great interest in the coming congress, not only from the engineers composing these societies, but from the engineers of the governments of Europe—France, Germany, Holland and Belgium. The interest in the congress among the engineers of Great Britain and the officers of the great engineering societies of that country was not less than that shown on the continent. In fact, the promise of support and expression of a desire to attend were universal. Among the large societies which accepted the invitation were the Mechanical Engineering Society and Society of Civil Engineers and Architects of Germany. Each of these societies has a membership of about 6,000.

The allotment of wall space in the fine arts building to various nations for the hanging of pictures, to be exhibited at the World's Fair, has been made as follows:

Nation.	Lineal feet.	Hanging space, square feet.
United States	2,475	34,636
Great Britain	1,401	20,325
Canada	193	2,895
France	2,082	33,393
Germany	1,438	20,400
Austria	806	11,564
Belgium	835	12,318
Italy	810	12,410
Norway	550	8,402
Sweden	497	7,005
Denmark	273	3,930
Russia	554	7,725
Spain	550	7,807
Holland	656	9,337
Japan	206	2,919
Mexico	125	1,800

Clarifying Cider, Ale, and Beer.

The only clarifying agents permitted to be used in Bavaria, the country which is renowned for the best and purest malted liquors, are *mechanical ones*, that is, such as will not enter into solution or remain in the liquid under any circumstances. The principal ones are *isinglass* and fine *wood shavings*. Clarifying by means of isinglass is so well known that it need not be described here. The second method, however, is not so well known, and, as it is quite effective, a brief description of it will be of use to many of our readers.

Any kind of moderately close-fibered wood which is free from strongly tasting resinous matter may be used for this purpose, but the most suitable has been found to be beech wood and hazel wood. Either of these is cut into lengths of six to twelve inches, the bark carefully removed, and the wood reduced by a machine to shavings, which ought to be as thin as possible. These must be deprived of tannin by being soaked for several days in cold water, and afterward repeatedly boiled with water until the latter no longer acquires any color. Only a comparatively small portion of these purified shavings need be used for a cask of the liquid to be clarified—about one-half pound for 15 gallons. The *modus operandi* by which the clarifying is accomplished is, of course, a purely mechanical one, mostly due to currents established by capillary attraction into the fibers of the wood floating on top of the liquid, and the mechanical adherence of suspended impurities to the surface of the shavings, as a new portion of the turbid liquid is brought toward the surface.

When the casks are emptied, the shavings may be taken out, washed, and used over again. The wood shavings are a regular article of trade, and may be obtained through dealers in brewers' supplies.

Trade Mark—Infringement.

In the case of White *et al. vs.* Miller *et al.*, recently decided by Judge Colt, in the United States Circuit Court, at Boston, a suit was brought to restrain the infringement of a trade mark. The complainants were the owners of a trade mark used on a brand of whisky, which consisted of a chicken cock standing upright in a circle surrounded by certain words. The defendants sold a brand of whisky upon which they used as a trade mark a chicken cock standing upright in a circle. The words surrounding the circle were not the same in both cases, but the court held that there was a clear case of infringement.

RECENTLY PATENTED INVENTIONS.

Railway Appliances.

CAR COUPLING.—Simon J. Freeman, Bradford, Pa. This is a simple, durable and inexpensive coupling, adapted for application to either a freight or a passenger car, coupling automatically and holding securely until purposely uncoupled, the uncoupling being effected from either side or the top of the car. A spring-pressed knuckle is pivoted in the drawhead, the spring normally holding the knuckle in coupling position, and a finger is projected from the opposite front of the drawhead to extend beneath the knuckle, a shifting lever being provided whereby the knuckle may be carried to uncoupled position.

DUMPING FREIGHT CAR.—Robert M. Johnson, Flemington, N. J. Beneath the bottom of this car is a winding shaft to which is attached a chain extending transversely across the dumping doors, the opposite end of the chain being secured beneath the car. The construction and location of the mechanism is such that the dumping doors may be opened as readily in inclement weather as in good weather, the condition of the contents of the car having no effect upon the operation of the mechanism, while the entire area of the discharge opening in the car bottom may be exposed as required.

Mechanical Appliances.

FIBER MACHINE.—Luis B. y Sanchez, Matanzas, Cuba. Combined with carrying wheels or drums, one in advance of the other, over which pass cables, is a reversing mechanism between the drums adapted to turn a leaf end for end, cables acting in conjunction whereby the leaves are held in engagement with the reversing mechanism and with the drums. The leaves from which the fiber is to be extracted are fed at one end of the machine, which is designed to deliver the fiber in a perfect state at its opposite end, the leaf in its transit being so held that the skin and pulp of one half will be first bruised and loosened, the other half being held fixed, an automatic transfer of its position being then effected, after which the other half is subjected to the cleaning process, when the fibers are thoroughly cleaned and delivered in regular order to an apron. The cleaning rolls or cylinders are so constructed that they will not discolor the fiber.

MACHINE TO CUT TAN BARK.—Albert F. Jones, Salem, Mass. This machine has a casing in which is a transverse web, supporting knives, a hopper being arranged on the front end of the casing, and a wheel turning between the hopper and the web. The wheel is provided at its front end with knives for cutting the bark into strips, while wings held on the wheel form a feed for the fixed knives on the web. This machine is of simple construction, and designed to be durable and very effective in operation.

WRENCH.—Lewis C. Hurd, Durango, Col. This improvement consists of a bar forked at one end and provided with serrations on the inner surface of one of the arms of the fork, the bar being beveled and serrated at the opposite end and furnished with a pivoted serrated jaw, designed to act in conjunction with the serrated end of the bar as an adjustable wrench. A screw driver blade is formed on the outer end of the pivoted jaw, the implement forming a simple and inexpensive tool for turning and holding round or polygonal rods, nuts, gas burners, etc., and for the use of bicyclists to turn the spokes of the wheels.

Agricultural.

HAND CORN PLANTER.—Jeremiah W. Champion, Rockport, Me. The seed receptacle of this planter is attached to a body board or plate which has a delivery chute at its lower end normally closed by a spring-controlled gate. In operation the delivery spout is pressed into the ground up to an adjustable gauge plate, when a slide is operated permitting the seed to escape into the ground and bringing more seed into a pocket ready for planting. A positive rotary feed is obtained by the device, and one that is very simple in construction and applicable to any form of hand planter.

PLANTER AND FERTILIZER DISTRIBUTER.—Joseph Lande, Monticello, Ark. This is a machine adapted to drop either fertiliser or seed, there being an adjustable auxiliary bottom fitted in the hopper whereby a fine or coarse fertiliser may be distributed, the feed wheel, as the machine is drawn over the ground, drawing the fertiliser from the hopper and dropping it, while agitators stir up and loosen the fertiliser to maintain a constant supply. The fertiliser or seed falls into a furrow opened by a forward plow and is covered by rear plows. The machine is of simple and inexpensive construction and designed to do its work very efficiently.

Miscellaneous.

LABELING MACHINE.—Frank Mueller, Albany, N. Y. This is an improved machine for quickly, accurately, and securely attaching labels to bottles, cans, and other receptacles, one operator, by its use, conveniently handling a large number of bottles and firmly attaching the labels. A bottle receiver contains a pad adapted to be dipped in a paste box next to which is a label table, revolving brushes being arranged next to the table, while there is a plunger for pressing a bottle between and through the brushes and means for imparting simultaneously a vertical sliding motion to the receiver and to the plunger.

BELAYING PIN.—John W. Collins, Ludington, Mich. A pendulum lever is used, according to this invention, in connection with belaying pins of novel construction upon a hinged plate upon the rail, the connection between the levers and the pins being so made that when a vessel lists dangerously the belaying pins will be acted upon on the weather side of the vessel to cause the sheets and halyards to automatically and quickly release themselves from the pins, thus permitting the hull of the vessel to right itself. The construction is such, also, that the halyards, sheets, and other ropes may be shifted in a convenient and expeditious manner in the regular working of the vessel.

CASH RECORDER.—Wooster B. Metcalfe and Frank A. Ziegler, Hanover, Penn. This invention provides an improvement in cash drawers and recorders whereby a cash transaction, a credit purchase, the making of change, or paying out of an amount, will be duly entered upon a record slip, carried under a glass to prevent erasure or alteration, a bell being sounded as the drawer is opened. The box or casing in which the mechanism is arranged is designed to be locked and the key carried by the proprietor to prevent tampering with the record slip or mechanism.

CALENDAR AND KEY RING.—Andrew B. Dwigans, Chicago, Ill. A perpetual pocket calendar which may also be used as a key ring is provided by this invention, the device having means for the easy attachment of keys to it, while it may be quickly and nicely adjusted to indicate the day of the week, month and year, and may be changed to adapt it for any year. It is preferably made of disk shape, so there will be no corners to wear on the pocket, and consists of a face and back plate centrally pivoted by a rivet, the face plate carrying near its rim the names of the months, and a square with figures up to 31, above which is a slot where the initials of the days of the week appear, showing through from the back plate as it is turned to the proper position. A split ring inserted in a marginal hole holds the two plates in correct position.

SELF-CLOSING GAS BURNER.—William M. Roberts, Joliet, Ill. This is a burner arranged to close automatically when the flame is accidentally blown out or the gas is shut off at a distant point. The tip passes through an opening in a plate made of two metal strips of different material, preferably brass and steel, so that when the plate is heated by the flame it bends upward. On the under side of the plate is a downwardly extending rod engaging a spring on the burner pressing on a wheel on the cock, the wheel containing a spring to close the cock when the other spring is disconnected, such disconnection being effected by the movement of the rod on the cooling of the plate to which it is attached.

BICYCLE MECHANISM.—David J. Hoopes, Philadelphia, Pa. This invention consists of a wheel formed with a hollow hub journaled in the bicycle frame, and carrying on its periphery a pinion in mesh with an internal gear wheel on a shaft passing through the hub, and also journaled in the bicycle frame. The improvement forms a driving mechanism of simple and durable construction, permitting of easily running the wheel at a high rate of speed and rendering its construction very compact and strong.

VEHICLE POLE.—John W. Jeffery, Canton, N. Y. This is an adjustable pole adapted to vehicles of different widths. The pole has a cross piece at its rear end, secured to the pole in the usual way, braces attached to the ends of the cross piece being secured to the pole by bolts, and the rear ends of the braces are provided with eyes, while between the eyes and the pole in each brace is a longitudinal slot. The pole iron passes through the eye on the brace, extending forward underneath, and the iron is adapted to be moved in or out and securely clamped to the brace in any desired position.

AXLE BEARING.—David Wigger, New York City. A simple, cheap, and easy running bearing is provided by this invention, adapted for application to all sorts of vehicles, and the outer end of the hub is so rounded off that when struck by the hub of another vehicle it is not likely to be injured. The outer end of the axle box is closed and its inner end recessed and screw-threaded, while the axle has enlarged bearings in the box and a collar to fit the recess, a nut on the axle entering the threaded portion of the box, and a binding screw being held partly in the nut and partly in the box.

HARNESS SADDLE.—Louis A. Mancini, Montclair, N. J. This is a saddle for single harness, and is so made as to be expeditiously and conveniently fitted to the back of any horse. The construction provides for holding the tree of the saddle at an elevation above the back of the animal to which the saddle is applied, and the pads are so made that they will not chafe or injure the skin, the pads being also amply ventilated.

REIN SUPPORT.—David Hand, Netherwood, N. J. This is an improvement on a formerly patented invention of the same inventor, providing a tail guard and line rest capable of attachment to any harness. The body of the device is formed of a rod or strap bent to form two forwardly converging members having their ends connected, in connection with inwardly and outwardly extending link-like rest arms and a rearwardly extending bow forming a tail guard. The device is very simple, durable and inexpensive, and in using it the lines cannot possibly become entangled with the animal's tail.

TRACE SUPPORT.—Russel W. Minard, Larned, Kansas. This is a simple and inexpensive metallic loop device adapted to be readily raised or lowered on the skirt to assume the proper position to carry the trace according to the size of the animal, the device being connected at its lower end with a strap to which the belly band may be buckled.

PIER.—Ommund Haerem, Houston, Texas. This invention relates to piers for bridges and other substructures, the pier consisting of a shell having inside sets of ears through which are passed rods, each having at its lower end an anger adapted to screw into the ground or bed of the river, nuts screwing on the upper threaded ends of the rods to abut against the upper set of ears. The shell is made of two vertical parabolic sections, the vertical side edges of the two sections being joined together and their joints extending in line with the current of water of the river. The construction possesses great strength and stability, and is readily sunk in the water and fastened in place.

BARREL.—James P. Cowden, Cedar Rapids, Iowa. This is a ventilated barrel for transporting fruits, etc., designed to be light and of great strength, and retaining its original shape when the upper hoops are removed to take out the head. It is formed of a series of staves held spaced apart, each stave formed of an outer and an inner member, the ends of which abut and are secured together, while one or more hoops are interposed between the inner and outer members of the staves, whereby each stave is trussed and strengthened, the barrel thus affording an elastic covering to protect its contents from shock.

TRANSOM LIFTER.—Henry A. Brennan, 214 Warren Street, Jersey City, N. J. This is a window worker adapted for use in connection with tilting windows, etc., affording a safeguard against burglaries and facilitating ventilation, being also well adapted for use on a series of windows in factories and all kinds of buildings, and on steamboats, railroad cars, etc., the device being made to operate one or all the windows as desired. When the windows are one above the other a vertically movable hollow shaft connects with a portion of the windows, the shaft having a slot in one side, a rod held to slide in the shaft being also connected with a portion of the windows. The device may be conveniently worked from the inside, but holds the windows so they cannot be opened from the outside.

HEAD AND SHOULDER REST.—Levi L. Pletcher, McConnellsville, Ohio. This is a device for use in a coffin, consisting of two oppositely supported shafts projecting through the head wall, and adapted to be rotated and locked at any point, in connection with flexible bands, whereby the position of the head and shoulders may be altered as desired without touching the corpse.

CLAMP.—Wilhelm H. E. Brande, Hamburg, Germany. This is a device in which two jaws are pivotally connected intermediate of their ends and a hanger having a pin projects into inclined slots in the upper ends of the jaws, the clamp being designed to hold small articles, such as documents, garments, etc., the weight of the clamped articles increasing the firmness of the hold.

BED FAN.—William H. Wrigley, New Orleans, La. This is a device adapted to be set up by a bedside and operated by a treadle by an attendant, consisting of a light standard from which projects a shaft carrying a fan wheel, the height of which can be readily adjusted, while the fan may be turned to throw the breeze in any direction. The device is operated noiselessly and almost entirely without friction.

UNDERWAIST.—George D. McKay, Aurora, Ill. This is a child's underwaist, designed to be a highly elastic and comfortable garment, with a central opening down the back, the portions of the garment on the sides of the opening being connected at the shoulder, with corresponding front portions crossed by elastic bands, while a vertical band attached to one of the cross bands connects with the lower portion of the body, etc.

DESIGN FOR A PEDESTAL.—Alexander J. Windmayer, Fort Madison, Iowa. This design includes a base in the form of a column, surmounted by a globe having clouds at its base, while on the globe is a statue to represent Columbus, bearing in his right hand an uplifted sword and the left hand grasping the staff of an unfurled flag. The globe is presented so that North America appears in front.

DESIGN FOR A BOTTLE.—Joseph P. Cherry, Nashville, Tenn. This is a design for an ink bottle in which the ink is used from the bottom and the surface for evaporation is limited to the cork hole, only the pen point being passed into the bottle, so that the ink will not creep up the holder, while the bottle, if accidentally tipped over, will always stop with the hole up.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention and date of this paper.

NEW BOOKS AND PUBLICATIONS.

THE MEDITERRANEAN SHORES OF AMERICA—SOUTHERN CALIFORNIA. Its climatic, physical and meteorological conditions. By P. C. Remondino, M.D. Philadelphia and London: The F. A. Davis Co., publishers. 1892. Pp. xiv, 160. Price, cloth, $1.25. Paper 75 cents.

This work is an energetic eulogy on the beauties, healthfulness and attractiveness of Southern California. It presents numerous illustrations of different localities, with statements of the meteorology and healthfulness of the country. Among the illustrations we note one of an Indian 140 years old and another of a white man 119 years old, given as tributes to California's air.

THE HYGIENIC TREATMENT OF CONSUMPTION. By M. L. Holbrook, M. D. New York: M. L. Holbrook & Co. No date. Copyright, 1891. Pp. 219. No index. Price $2.

The nature and causes of the disease, its prevention and treatment in its earlier stages, and its treatment in more advanced stages, form three divisions of this work, including 25 chapters. Many of the chapters are very practical in their titles, and the whole work seems composed from the general standpoint of common sense treatment of this complaint. A considerable portion of the work is devoted to 'physical culture, from Indian club] exercises, through vocal] gymnastics and horseback exercise, down to the sun bath.

MANUAL OF ASSAYING GOLD, SILVER, COPPER AND LEAD ORES. By Walter Lee Brown, B.Sc. Chicago: E. H. Sargent & Co. 1892. Pp. 533. Price, $2.50.

The fire assay of the ores of the metals named is the real subject of this work. The author distinguishes sharply between assaying and analyzing and devotes his work to scorification and crucible assays for the most part. We notice, however, that the volumetric assay of copper and quartation of gold are given in the appendix. A bibliography of the subject, with the list of the principal ores of the United States, is also to be found in the appendix.

THE DRAINAGE OF HABITABLE BUILDINGS. By W. Lee Beardmore. New York: Macmillan & Co. London: Whittaker & Co. 1892. Pp. x, 89. Price $1.50.

The general subject of house plumbing is treated by this author. The work is of special value as indicating an English author's view on a subject which has received a great deal of attention in this country. A number of illustrations are given as required and a full index closes the work.

A TEXT BOOK ON RETAINING WALLS AND MASONRY DAMS. By Mansfield Merriman. New York: John Wiley & Sons. 1892. Pp. iv, 122. No index. Price $2.

The author's belief that example is better than precept has not prevented him from producing a very useful work treating of the subject of the resistance of walls to pressure, both with regard to overturning and sliding. Throughout the work analytical methods are used for investigating the problems, without, however, having recourse to the very highest mathematics. The work, as far as it goes, will be within the scope of all algebraists.

ELECTRICITY UP TO DATE FOR LIGHT, POWER AND TRACTION. By John B. Verity. London and New York: Frederick Warne & Co. Pp. 178. Price 75 cents.

Although no date is stated on the title page, the name of the work is supplemented and to some extent given a meaning by at least the dating of the preface—November, 1891. The work is treated largely from a trade and English standpoint. The particulars of the capital and operations of a number of English companies are given, and throughout the subject of practical and business electricity from the English standpoint is the motive of the work. It is to be remarked that an undated copy of a book entitled "Electricity up to Date" is rather confusing.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(4362) **R. S. H. asks: 1. How can I test** limestone to find if it contains phosphorus? A simple test, as I am no chemist. A. There is no simple test. Dissolve in nitric acid and add a large excess of ammonium molybdate dissolved in nitric acid. A very bright yellow precipitate indicates phosphoric acid, provided no silica or arsenic acid is present. 2. What is the necessary analysis of sand used, for furnace bottoms in open hearth steel making, and why common silica sand does not answer the purpose? A. Such sand would incline to run into slag with the oxide of iron. It would not possess enough consistency. An absolute analysis of the sand is not necessary. For the ordinary acid process a siliceous sand is used which should have cementing qualities, so as to make a solid bed. 3. If an electro-magnet or an iron core surrounded with a coil of wire was held near the armature and between the poles of an electric motor, would not a current be induced in the coil? A. Under the conditions a slight current might be generated if th. coil made a closed circuit. 4. There was an electric candle used for alternating current arc lamp, consisting of two carbons placed together and insulated from one another. I have forgotten the name of the inventor, but it is a foreign invention. What is the failing of this lamp, and why is it not now used? A. You refer to Jablochkoff's candle. It was not economical.

(4363) **G. K. asks: 1. When $FeSO_4$ is** boiled with HNO_3, $Fe_2(SO_4)_3$ is produced; please give the equation or reaction. A. An excess of sulphuric acid is required, hence your statement is incorrect The following is the reaction: $12FeSO_4+2HNO_3+6H_2SO_4=6Fe_2(SO_4)_3+2NO+4H_2O$. 2. Is the lightning rod still considered a protection against lightning? A. Yes. See our SUPPLEMENT, Nos. 746, 650, 249, 348, 525, 288.

(4364) **N. P. writes: I wish to know of** a simple and sure test that I can employ to find if there is an adulteration of white arsenic in powdered borax. Have used a little of it bottled in soft water for the complexion. A. Dissolve in water, add a little hydrochloric acid and place a drop on a bright surface of copper. A lead-colored stain indicates arsenic. Borax acts as a mild alkali. The above test is not sure, but will answer your purpose, we think.

(4365) **J. F. writes: The photographs of** bullets taken by Professor C. V. Boys cannot be correct. As quoted, "the bullets had not had time to settle down to steady flight, but were variously tilted across the path." It is well known that the stability of an ordinary rifle bullet decreases toward the end of its flight, and with the modern magazine rifle I find no variation of angle up to twenty feet from the muzzle.

(4366) **W. W. N. asks: How many cells** of simple plunge battery described on page 400, "Experimental Science," will be required to operate a two candle power incandescent lamp at short periods at a time, and how long would they operate the lamp if used continuously? A. It will require 3 cells. Such a battery will run a lamp for about two or three hours continuously.

(4367) **H. P. asks for formula for printing** on cloth from a negative. A. Prepare the following:

Boiling water	20 oz.
Chloride of ammonium	100 grs.
Iceland moss	60 "

When nearly cold, filter and immerse the linen for 15 minutes. Sensitize for 15 minutes in an acid, 20 grains to the ounce, silver bath, and when dry stretch over a cardboard. Print deeper than usual and tone in a solution of—

Water	20 oz.
Acetate of sodium	2 drs.
Chloride of gold	3 grs.

Add a few grains of common whiting. Fix in hypo 1 ounce to 20 ounces of water.

(4368) **A. H. asks (1) the method used** for transferring photographs on to gold and silver watch domes to be durable. A. You can by using Eastman's transfer photo paper transfer a picture on to a watch dial without difficulty. Address Eastman Co., Rochester, N. Y. 2. If diamond steel can be bought for engraving on gold and silver, and is it better for holding an edge than the ordinary Stubs steel? A. The diamond brand of steel is not made in suitable sizes for gravures. The Swiss steel gravers are a favorite with jewelry and watch engravers.

(4369) **W. T. N. asks: What causes the** peculiar acid smell when any steel instrument is being sharpened on a whetstone where water is used? A. The peculiar smell of a stone when rubbed is due to the odor of the stone; it will be the same when two stones are rubbed together. It may sometimes be attributed to ozone.

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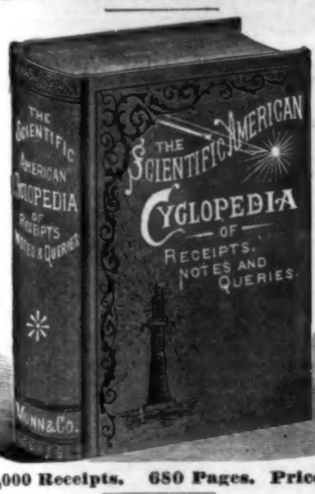

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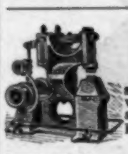

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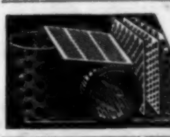

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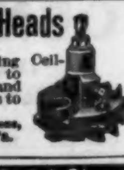

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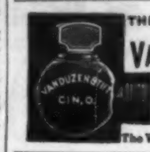

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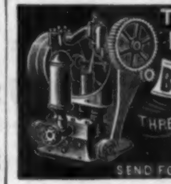

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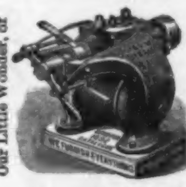

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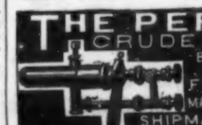

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